NATIONAL CAR BUILDER

VOLUME XIII.
NUMBER 3.

DEVOTED TO THE INTERESTS OF RAILWAY ROLLING STOCK.

$1.00 PER ANNUM
SINGLE NUMBERS, TEN CENTS.

NEW YORK:
Published at 5 and 7 Dey St.

MARCH, 1882.
ENTERED AT THE POST OFFICE AT NEW YORK, N. Y., AS MAIL MATTER OF THE SECOND CLASS.

CHICAGO:
144 N. Clark Street.

Boston. STANDARD CAR VARNISHES. Boston.
BURBANK, RYDER & DAMON.
Boston. Boston.

NATIONAL RAILWAY
PATENT WASTE COMPANY.
The most economical, efficient and desirable material for packing JOURNAL BOXES of CARS is Cotton Seed Hulls.
The company proposes to license railroads to use this valuable article for packing, on very liberal terms.
Send for circular to
H. W. GUERNSEY, President,
240 Broadway, New York.

Plain and Decorated Leathers
FOR
UPHOLSTERING
Railroad Cars.
Panel and Ceiling Decoration for Finest Palace Cars.
Master Car-Builders and Purchasing Agents write to
CHAS. R. YANDELL & CO.,
6 East Eighteenth Street, New York.

CLIFF, RIGHTER & CO.,
MANUFACTURERS OF
SPRINGS,
5 Dey St., New York.
FACTORY, OSWEGO, N. Y

GEO. WESTINGHOUSE, Jr., President. T. W. WELSH, Superintendent. JOHN CALDWELL, Treasurer. W. W. CARD, Secretary. H. H. WESTINGHOUSE, General Agent.
THE WESTINGHOUSE AIR-BRAKE COMPANY,
Pittsburgh, Pa., U. S. A.,
MANUFACTURERS OF THE
WESTINGHOUSE AUTOMATIC BRAKE,
WESTINGHOUSE LOCOMOTIVE DRIVER BRAKE,
VACUUM BRAKES (Westinghouse & Smith Patents),
WESTINGHOUSE AIR BRAKE.
Particular attention is called to the "AUTOMATIC" and "LOCOMOTIVE DRIVER BRAKES," now being tested and adopted by the prominent lines.
With the "DRIVER BRAKE" the engineer can handle an ordinary freight train better than with brakemen. The saving in car wheels and wages will therefore be apparent. On shifting or yard engines it is invaluable.
The "AUTOMATIC" has proved itself to be the most efficient train and safety brake known. Its application is instantaneous; it can be operated from any car in the train, if desired, and should the train separate, or a hose or pipe fail, it applies automatically. A GUARANTEE is given customers against LOSS from PATENT SUITS on the apparatus sold them.
FULL INFORMATION FURNISHED ON APPLICATION.

GEORGE WESTINGHOUSE, Jr., President. C. H. JACKSON, General Manager. RALPH BAGALEY, Vice-Pres. and Treas. ASAPH T. ROWAND, Secretary. HENRY SNYDER, General Agent.
THE UNION SWITCH AND SIGNAL CO.,
A CONSOLIDATION OF
The Union Electric Signal Co., of Boston, Mass., and of the Interlocking Switch & Signal Co., of Harrisburg, Pa.
Sole Owners and Manufacturers of the only Practically Successful System of
OPERATING RAILROAD SIGNALS AUTOMATICALLY,
Also of Apparatus for Operating and Interlocking Switches, Signals and Gates by Levers, Hydraulics, Pneumatics or Electricity. Also Manufacturers of FROGS, CROSSINGS, SWITCHES AND SWITCH STANDS. Plans, estimates and detailed descriptions, together with references to apparatus in practical operation, will be furnished upon application. Address all communications to
THE UNION SWITCH AND SIGNAL CO.,
PITTSBURGH, PA.

GEORGE WESTINGHOUSE, Jr., President. RALPH BAGALEY, Secretary and Treasurer. H. H. WESTINGHOUSE, Superintendent.
THE WESTINGHOUSE MACHINE COMPANY,
Liberty Ave., 24th and 25th Sts., Pittsburgh, Pa., U. S. A.,
MANUFACTURERS OF
THE WESTINGHOUSE STEAM ENGINE,
Only needs an examination to commend it;
THE ALDEN CRUSHER AND PULVERIZER
Will pulverize more ore, limestone, etc., etc., in a given time than any known machine;
THE STRONG PURIFIER AND HEATER,
A reliable device for cleansing and heating feed water for boilers;
DAMASCUS BRONZE,
A recently discovered composition, especially adapted to locomotive and car journals.
FULL INFORMATION FURNISHED ON APPLICATION.

Warranted Superior to any Steel in the Market, either English or American, for every purpose. Send for Circular and Price List.
CHROME CAST STEEL.
CHROME STEEL WORKS,
Kent Av. & Keap St., Brooklyn, E.D., N.Y.

BOUND VOLUMES
OF
THE
National Car-Builder
For 1881
NOW READY.
Price, $3.00.
NATIONAL CAR-BUILDER
5 Dey St., N. Y.

THEY ARE THE BEST AND CHEAPEST.
STEWARTS BRUSHES
WE MANUFACTURE
ALL KINDS OF BRUSHES, AND MAKE A SPECIALTY OF RAILROAD AND LARGE MANUFACTURERS' TRADE.
We warrant every brush we make to be full size, best quality, and to give entire satisfaction until worn out, not get stiff when worn only half way. If you use them once you will have no other.
STEWART BROS. CO., Pittsburgh, Pa

CAR GLASS
A SPECIALTY.
Plate Glass 1-8, 3-16, 1-4 thick.
Crystal Plate 1-8 thick,
Double Thick French.
Crystal Sheet Glass,
26 oz. English Glass.
Double Thick American.
All kinds of ORNAMENTAL GLASS for Drawing-room Cars, Sleepers, etc., etc. Ordinary Window, Rough and Ribbed Glass, for Depots, Shops, etc., etc. Colored Glass for Signals, etc.
Quotations, Samples and Designs sent on application.
HOLBROOK BROTHERS, 87 and 89 BEEKMAN STREET, NEW YORK.

JOURNAL OF THE ASSOCIATION OF ENGINEERING SOCIETIES.
$3 A YEAR; 30c. A NUMBER.
H. C. PROUT, Secretary Board of Managers, 12 Barclay Street, New York.
CONTENTS—No. 1. Experiments on Percolation of Water, with Discussion. Memoir upon Steam Engines. Explosions of Flour Dust. Hudson River Tunnel. Street Pavements. Association and Society Proceedings.
CONTENTS—No. 2. Water Lifter, Boisé City, Idaho. Estimation of Distances by Time in Riding. Tables for Determining the Proper Sizes of Sewers. Experiments with a Gas Engine. Railway Water Supply and the Haggas Elevator. Arching Wooden Howe Trusses—Observation on Wooden Bridges. Deflections of the Howe Truss and Parabolic Bowstring. Society Proceedings.
CONTENTS—No. 3. Some remarks on Tastes and Odors of Surface Waters. Graphical Method of Studying Efficiency of Water Distribution Systems and Performances of Fire Engines. Tests of Completed Compression Members, with Reflections upon their Details. Water Waste and Water Meters. The Rise and Fall of a Railroad Company, 1837-42. Society Proceedings.
WITH NUMEROUS DRAWINGS.
These papers are all by practical and known engineers. A few advertisements will be inserted at invariable rates.

SAND BLAST PROCESS FOR SHARPENING FILES.
Files may be several times re-sharpened, making a saving of 50 to 60 per cent., and again of 33 1-3 per cent. in amount and quality of work by using sharp files. Its worth certified to by well-known companies. Apparatus erected on trial. Address SAND BLAST FILE SHARPENING CO., WILMINGTON, DEL.

R. T. WHELPLEY,

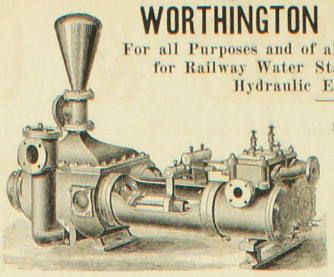
GENERAL WESTERN AGENT

Hamilton Rubber Co.

RUBBER AND LEATHER BELTING, Packing, Rubber, Linen and Cotton Hose, Raw-Hide Lace Leather, Car Springs, Mats, etc. Also manufacturers of the celebrated DOUBLE-TUBE AIR BRAKE HOSE and "HERCULES" STEAM FIRE ENGINE HOSE. Write for Price-List and Discounts.

R. T. WHELPLEY,
131 and 133 Lake Street, Chicago.

WORTHINGTON STEAM PUMP,



For all Purposes and of all Sizes. Special Patterns for Railway Water Stations, Oil Pipe Lines, Hydraulic Elevators, etc.

Prices below those of any other Steam Pump in the Market.

SEND FOR CIRCULAR.

Henry R. Worthington,

239 BROADWAY, NEW YORK.
70 KILBY ST., BOSTON.
707 MARKET ST., ST. LOUIS.

IRON CLAD PAINT.

Trade-Mark Patented.

This Paint is used by nearly all the Railroads in the Country.

Used by L. S. & M. S., Wabash R'y, C., C., C. & I. R'y, C. & P. R'y, C., H. & D. R. R., Cincinnati Southern R'y, N. Y., L. E. & W. R'y, (Erie), Southern Central R. R., Canada Southern, Mobile & Ohio, N. O. & Mobile, Macon & Brunswick, Penn. R. R., C., M. & St. P. R'y, A. & N. R'y, R. & D. R'y, Carolina Central, P., C. & St. L. R'y, F. & E. R. R., M., L., S. & W. R'y, K. & D. M. R'y, W. C. & A. R. R., M., I. & N. R'y, N. C. & St. L., N. I. & E. R. R., I. & G. N. R. R., etc., etc.

IRON CLAD PAINT CO., Cleveland, Ohio.

THE E. D. ALBRO COMPANY,

DIRECT IMPORTERS OF

MAHOGANY,

WHICH WE MANUFACTURE

TO SIZES ESPECIALLY ADAPTED FOR CAR-BUILDERS.

Manufacturers of VENEERS from FRENCH WALNUT and all DOMESTIC WOODS. Importers of CABINET WOODS.

ESTIMATES FURNISHED.

Mills and Warehouse: 685 to 707 West Sixth St., Cincinnati.

Established 1858.

THE Prince Manufacturing COMPANY,

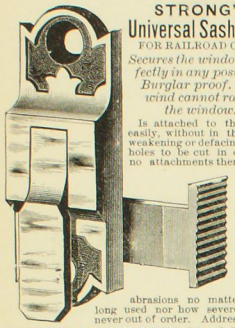
SOLE MANUFACTURERS OF

Prince's Metallic Paint.

The best Paint in the World for Iron, Tin and Wood.

Send for a Circular to

71 Maiden Lane, N. Y.



STRONG'S
Universal Sash Lock
FOR RAILROAD CARS.

Secures the window perfectly in any position. Burglar proof. The wind cannot rattle the window.

Is attached to the Sash easily, without in the least weakening or defacing it. No holes to be cut in casings, no attachments thereto, no abrasions no matter how long used nor how severely. Is never out of order. Address

UNIVERSAL SASH-LOCK CO., S. W. Cor. Hamilton and Liberty Streets, Albany, N. Y.

ANNUAL SALES 3,000,000 BOTTLES!

CARTER'S INKS

CARTER, DINSMORE & CO., BOSTON AND NEW YORK.

RAILROAD AND MACHINISTS' **SUPPLIES.**

SOLE MANUFACTURERS OF

EUREKA Post Hole Digger.

REDUCED PRICE, $3.

LIBERAL DISCOUNT TO THE TRADE. A valuable tool for nurserymen and well-diggers. Send for circular.

CAMPBELL & LILL,
223 Lake St., Chicago, Ill.

$ $ $ $ SAVED $ $ $ $

1977 NINETEEN HUNDRED SEVENTY-SEVEN 1977

MACHINES

BOTH NEW AND SECOND-HAND

COMPRISING MACHINE AND BLACKSMITH TOOLS OF EVERY DESCRIPTION. WOOD-WORKING MACHINERY IN ALL ITS BRANCHES. PORTABLE ENGINES. UPRIGHT and HORIZONTAL STATIONARY ENGINES, 1 TO 300 HORSE POWER. **S.C.F.&CO.** LOCOMOTIVE FIRE-BOX, HORIZONTAL, and UPRIGHT BOILERS, 1 TO 100 HORSE POWER. WATER WHEELS, COTTON AND WOOLEN MACHINERY, STEAM PUMPS, GRISTMILL MACHINERY, Etc., FULLY DESCRIBED, AND PRICES ANNEXED,

☞ Send stamp for same,] In our List No. 23. [stating what you want. ☜

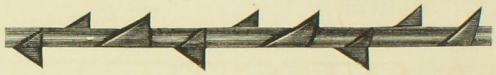
We have the Largest Assortment of Machinery to be found in the hands of any firm in the country.

Works and Main Office, Manchester, N. H. **S. C. FORSAITH & CO.**

Branch Office and Wareroom, 209 Center street, New York City.

AMERICAN BARB FENCE WIRE.

PAINTED, JAPANNED OR GALVANIZED.



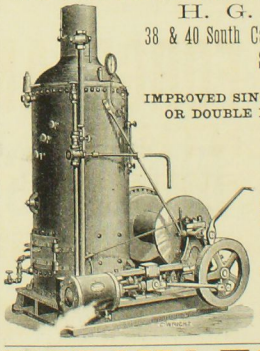
This Wire contains six times as many Barbs per foot as any other, and is the only Fence that is as efficient against small as against large animals. It will not slip through the Staple, and is the only Barb Wire that is **Galvanized after it is Finished,** which adds greatly to its strength and durability. This Wire is made on an entirely different principle from any other, is amply secured by Letters Patent and no infringement upon any other Patent Right.

AMERICAN FENCING CO.,

Works: Nos. 232, 234, 236, 238 West 29th Street. Nos. 229, 231, 233, 235, 237, 239 West 28th Street. Office: 234 West 29th Street, New York.

ROCHESTER MACHINERY MF'G CO.

H. G. WORMER & CO.,
38 & 40 South Canal St., Chicago, Ill., Branch, 807 North Second St., St. Louis, Mo.



IMPROVED SINGLE OR DOUBLE CYLINDERS—SINGLE OR DOUBLE FRICTION DRUMS OR REVERSIBLE LINK MOTION

HOISTING ENGINES,

And specially adapted to Pile-Driving, Pumping, Hoisting Timber, Brick, Mortar, Stone, Coal, Slate, Ores, Iron, Cargo Ballast. Also for Steamers, Ships, Lighters, Barges, Docks, Warehouses, Stevedores, Contractors, Railroads, Mines, Quarries, Etc., Etc.

Send for special catalogues.

We make 180 different sizes and kinds.

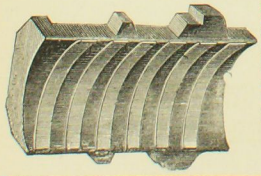
IMPROVED PORTABLE AND STATIONARY ENGINES—PORTABLE, STATIONARY AND VERTICAL BOILERS, SAW MILLS AND MACHINERY.

On application will be pleased to send you catalogue of what you may want in the shape of machinery.

☞ Say where you saw this. ☜

The Leroy Journal Bearing Co.,

145 BROADWAY, NEW YORK CITY,



Has the **SOLE RIGHT** to manufacture and sell **JOURNAL BEARING BRASSES** under Letters Patent issued to T. V. Leroy, Nov. 18, 1879, and reissued Feb. 17, 1880, Aug. 16, 1881. Testimonials, which may be seen at the office of the Company, show our brasses to be the Best and Most Economical in use. We claim that their use saves one-third in oil, and two sets will outwear three of any other brasses. Those interested in Railroads will do well to examine. Address

GEO. W. McLEAN,
President.

VERONA TOOL WORKS,

MANUFACTURERS OF

RAILROAD TRACK TOOLS, THE PATENT VERONA NUT-LOCK,

AND

THE PATENT VERONA SPRING WASHERS.

These SPRING WASHERS will be found very valuable in Cars, Locomotives, and Bridges, or anywhere it is desired to have a tight nut.

We are prepared to fill orders in any quantity.

METCALF, PAUL & CO.,

CHICAGO OFFICE: 22 WEST LAKE STREET. PITTSBURGH, PA.

Hopkins' Patent Lead-Lined, Self-Fitting Journal Bearings,

AND

Meneely's Patent Bell-Metal Ended Journal Bearings, for Reducing Lateral Wear.

MADE BY

GEO. R. MENEELY & CO., West Troy, N. Y.,
and Atlanta Brass Foundry (A. B. Bostick, Supt.), Atlanta, Ga.

GEO. W. READ & CO.,

IMPORTERS AND MANUFACTURERS OF

MAHOGANY

AND ALL FOREIGN AND DOMESTIC

CABINET WOODS.

QUALITY AND SIZES SPECIALLY DESIGNED FOR

CAR BUILDING.

Mills and Warerooms:

186 to 200 Lewis Street, foot Fifth and Sixth Streets, E. R., New York.

CALVIN WELLS. AARON FRENCH.

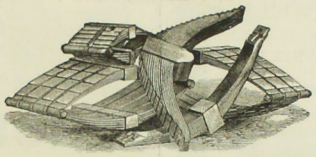
PITTSBURGH

CAST-STEEL SPRING WORKS

A. FRENCH & CO.,

MANUFACTURERS OF

EXTRA TEMPERED,



LIGHT ELLIPTIC

CAST-STEEL SPRINGS,

WITH PATENT HOT COMPRESSED BANDS FOR RAILROAD CARS AND LOCOMOTIVES.

UNITED STATES CENTENNIAL COMMISSION, OFFICIAL REPORT.—Diploma and Medal awarded for Good Design, Excellence of Workmanship and Material, Uniformity of Action and Durability.

OFFICE AND WORKS: Corner of Liberty and Twenty-first Streets, PITTSBURGH, PA.

H. A. LITTLE, Room 91, Boreel Building, New York; GEORGE DUNBAR & Co., 109 Milk Street, Boston;
GEORGE W. MORRIS, Room 5, Ashland Block, Chicago; M. M. BUCK & CO., 209 North Third Street, St. Louis, Mo., Agents

CALVIN WELLS, President and Treasurer. JAS. K. VERNER, Secretary.

PITTSBURGH FORGE AND IRON COMPANY,

Office: TENTH ST., near PENN AVE.,

PITTSBURGH, PA.,

MANUFACTURERS OF HAMMERED

AND

We make a Specialty of our well-known brand of Railway Axles marked "Special" from new iron, guaranteed to be purely fibrous, and to stand the regulation drop test of the Penna. R. R. Company.

ALSO,

BAR IRON & BOLTS,

Channel and Angle Iron, Bridge Bolts, plain and upset ends, all sizes, Track Bolts, Square and Hexagon Head Bolts, Rivets, Washers, Fish Plates, Etc.

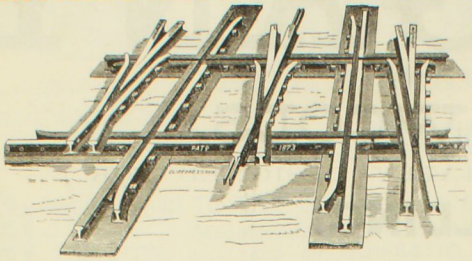
WM. E. UPTEGROVE & BRO.,

Mahogany & Veneer Saw Mills.

THE LARGEST WORKS of the KIND in the UNITED STATES

FOOT OF TENTH AND ELEVENTH STS., EAST RIVER, NEW YORK.

ELLIOT'S PATENT STEEL RAIL FROGS AND CROSSINGS.



These Frogs and Crossings are made of steel rail, combined with a wrought-iron frame, and bound together transversely with strong bolts, which gives them great strength and durability without destroying their elasticity. They are connected at all ends by Fish-Plate Joints, and lie on the same tie surface as the running rail without any cutting of ties, thus saving a great deal of time and labor in putting in place in track.

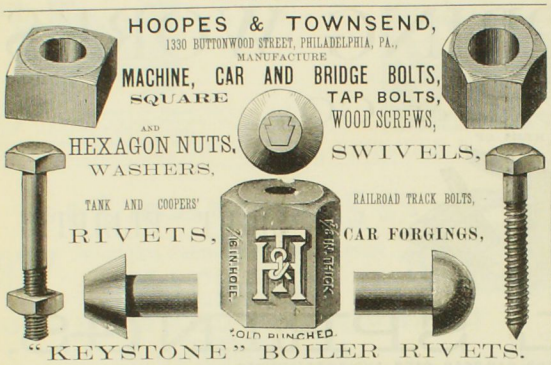
Manufactured by H. & H. ELLIOT,
East St. Louis, Ill.

HOOPES & TOWNSEND,

1330 BUTTONWOOD STREET, PHILADELPHIA, PA.,

MANUFACTURE

MACHINE, CAR AND BRIDGE BOLTS,
SQUARE TAP BOLTS,
AND WOOD SCREWS,
HEXAGON NUTS, SWIVELS,
WASHERS,
TANK AND COOPERS' RAILROAD TRACK BOLTS,
RIVETS, CAR FORGINGS,

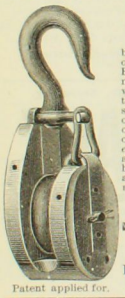


"KEYSTONE" BOILER RIVETS.

METALINE AND STAR ROLLER BUSHED TACKLE BLOCKS.

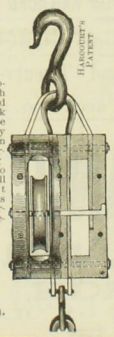
IMPROVED SNATCH BLOCK.

STAR ROLLER.



Patent applied for.

These celebrated make of Tackle Blocks are making a wide reputation for themselves throughout the U. S. on account of their *greater durability* and ease in hoisting over all kinds now in the market. Together with our Improved Snatch Block etc., these are worthy the attention of all Purchasing Agents, who will do well to inspect these goods before purchasing elsewhere.

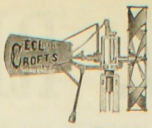


HAYWARD'S PATENT

☞ SEND FOR CIRCULARS OF OUR LATEST STYLES.

NEW YORK AGENCY, 33 SOUTH STREET.

BAGNALL & LOUD, 139 Fulton Street, Boston.



THE BEST
WIND MILL
ON EARTH!
CROFT'S
IMPROVED
IRON WIND ENGINE,

Manufactured by

E. C. LEFFEL.

Also dealer in Pumps, Tanks, Pipes, Corn Shellers, Corn Grinders, Power Converters with both Lever and Rotary Motion applied to Wind Mill Power, and everything pertaining to Wind Engine Machinery.

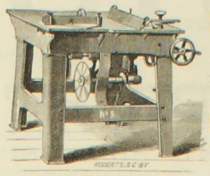
☞ Before purchasing any wind mill, send for circular and price list. Mention this paper.

SPRINGFIELD, OHIO.

VENEERS. 24 SAMPLES FIN WOODS, NINE CENTS.

Any one who works in wood will find these Prepared Veneers not only cheap, but beautiful and durable and easily applied. In use by Furniture Manufacturers, Piano and Organ Builders, Car Contractors, and for elegant finish in private residences. Follow directions, success sure. Send for descriptive circular and samples. 24 samples by mail 9 cents.

CHAS. W. SPURR,
209 Canal St., N.Y., and 522 Harrison Ave., Boston.



No. 3 Wardwell Saw Bench.

ROLLSTONE MACHINE CO.

Wardwell Saw Benches a specialty.

These machines are in use in the car-shops of the Penn. R. R., B. & O., P. W. & B. B. & A. F. R., Mich. Central, and some fifty other of the largest shops in the country

Also, A HEAVY BAND SAW FOR CAR WORK.

ROTARY, STATIONARY, BED & BUZZ PLANERS,

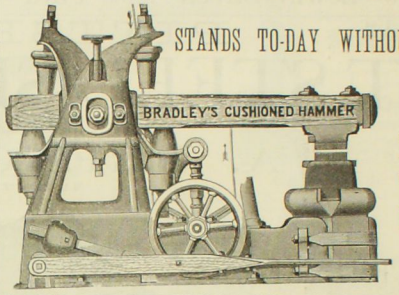
And a large number of other machines for car work.

We are dealers in all kinds of Second-Hand Machinery, Engines, Boilers, Iron and Wood-Working Machinery.

Do not buy until you send for new descriptive list, stating just what you want, inclosing stamp.

ROLLSTONE MACHINE CO., 131 WATER ST., FITCHBURG, MASS.

BRADLEY'S CUSHIONED HAMMER



STANDS TO-DAY WITHOUT AN EQUAL.

It approaches nearer the action of the Smith's arm than any hammer in the world.

BRADLEY & CO.,

Syracuse, N. Y.

[Established 1832.]

GROUND TRIPOLI,

THE BEST THING KNOWN FOR CLEANING AND POLISHING THE

METAL WORK on LOCOMOTIVES and CARS.

That manufactured by us is warranted not to scratch, and has been used for several years by the principal Railroad Companies and by Fire Departments generally, and is highly recommended by them. Send for sample.

GEORGIA MINING & MANUFACTURING CO.,

MINES AND MILL, DALTON, Ga. 63 BROADWAY (Room 40), NEW YORK.

Established 1818.

NEW ENGLAND GLASS WORKS.

W. L. LIBBEY & SON,

67 Federal St., Boston, Mass.

MANUFACTURERS OF THE

"N. E. Standard Railway Colors,"

RUBY, GREEN & BLUE,

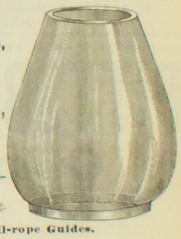
FOR

LANTERN GLOBES, CORRUGATED & BULL'S-EYE SWITCH LIGHT LENSES.

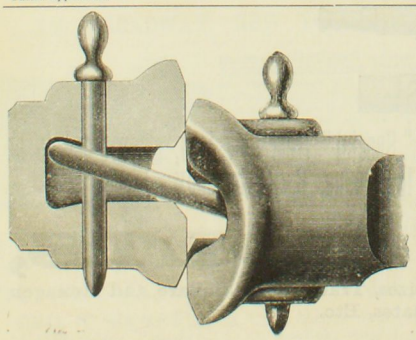
RAILWAY SUPPLIES IN GLASS, OF EVERY DESCRIPTION.

Head Light and Car Lamp Chimneys, Bell-rope Guides.

SEND FOR PRICES.



SAFFORD'S SAFETY DRAW-BAR.



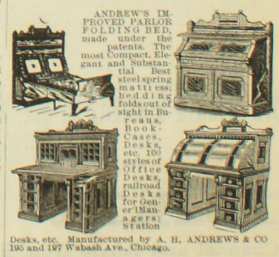
"VICTORY OVER MORE THAN 30 CONTESTANTS."

Victory over more than 30 Self-Couplers in the Master Car-Builders' Convention of June, 1876. Also indorsement for safety in coupling by the Yard Masters, in their Convention, June, 1877, and by 300 others who were unable to attend the Convention, and 300 railroad officials who are resident in 26 States, and who admitted superiority over any other yet produced. Try 30 free of royalty, and see for yourself! Pattern free, and no change in timbers or connections. Those made by Wilson, Walker & Co., Pittsburgh, Pa., *will save 200 per cent. in repairs*, and give double life service over *old styles of* wrought iron. About 43,000 in use by 146 railroads. The *saving in repairs* by using *my invention* is from 20 per cent. to 80 per cent. as per *report of many officers.*

J. B. SAFFORD,

Inventor and Sole Proprietor.

BUFFALO, N. Y.



ANDREW'S IMPROVED PARLOR FOLDING BED, made under the patents. The most Compact, Elegant and Substantial Best steel spring mattress bedding folds out of sight in Bureaus, Book-Cases, Desks, etc. 100 styles of Office Desks, railroad Desks for General Managers, Station Desks, etc. Manufactured by A. H. ANDREWS & CO 195 and 197 Wabash Ave., Chicago.

LOWE'S METALLIC PAINT COMPANY, Chattanooga, Tenn.,

MANUFACTURERS OF

Lowe's Metallic Paint!

This Paint has now been before the public sufficiently long to establish its qualities as first-class Metallic Paint in every respect. It has covering properties superior to any other Metallic Paint made. IT TAKES ABOUT 18 PER CENT. LESS OIL THAN ANY OTHER METALLIC PAINT.

It is absolutely free from Sulphates of every kind and description, which in many other Metallic Paints prove so injurious to Iron and Tin Roofs. It is manufactured in a very superior manner by being reground and carefully prepared, and is entirely available for inside finish when dark colors are desired. Its natural color is a Uniform Dark Blood Red. It is WARRENTED NOT LESS THAN 55 PER CENT METALLIC IRON, thus giving it a body excelled by no other Paint made. Its Fire Proof properties are excellent, and houses constructed of wood, and especially shingle roofs, are very materially protected by application of this Paint. It is not calcined nor burnt, consequently its color is unchangeable. We have Freight arrangements to nearly every city in the United States and Canada, and would name Prices delivered. Please read the Certificates hereto attached.

East Tennessee, Virginia & Georgia Railroad—Main Stem. Office of General Superintendent, Knoxville, Tenn., April 18, 1881.

S. B. Lowe, Chattanooga, Tenn.:
Dear Sir: * * * I will say that this company is using it both upon its Main Stem and Selma Division, and has found it perfectly satisfactory, and equal to any Lehigh Brown that we have used. It mixes well and spreads smoothly, and I find it much the cheapest paint that I can use for freight cars and such purposes. Very truly yours,
JNO. F. O'BRIEN, Gen'l Supt.

Wilkins, Post & Co., Engineers and Bridge Builders, Atlanta, Ga., and 102 Broadway, N. Y. Atlanta, May 16, 1881.

S. B. Lowe, Chattanooga:
Dear Sir: We have been using your paint on all the iron bridges that we are constructing on the M. & C., Georgia Western, and other railroads through the South, and find it of very superior quality *requiring less oil* and working with ease, and having excellent covering properties.
Respectfully, WILKINS, POST & CO.

Office of Peaslee, Gaulbert & Co., Manufacturers of White Lead, Colors, Ready Mixed Paints, etc., Louisville, Ky., April 15, 1881.

Lowe's Metallic Paint Co., Chattanooga, Tenn.:
Dear Sirs: * * * Your Metallic Paint has given perfect satisfaction wherever we have placed it. In grinding we find it takes from ten to twenty-five per cent less oil than various other brands of oxide of iron we have heretofore handled.
Very truly yours, PEASLEY, GAULBERT & CO.

King's Iron Bridge & Manufacturing Co., Cleveland, O., May 23, 1881.

Lowe's Metallic Paint Co., Chattanooga, Tenn.:
Gentlemen: We find your paint of first-rate quality for our use, and very economical. Yours truly,
KING BRIDGE CO.

Office of Scott & Co., Manufacturers of Scott's Sheet Iron Roofing, Cincinnati, May 4, 1881.

Lowe's Metallic Paint Co., Chattanooga, Tenn.:
Gentlemen: We consider it as good as any that we have used during our experience of over nine years, and shall use it largely. Yours, etc.,
SCOTT & CO.

W. G. Hyndman & Co., Manufacturers of Patent Sheet Iron Roofing, Cincinnati, May 3, 1881.

Lowe's Metallic Paint Co., Chattanooga, Tenn.:
Gentlemen: The paint which we received from you last month has given us perfect satisfaction. We regard it as the best iron ore paint that we have ever used.
Respectfully yours, W. G. HYNDMAN & CO.

P. S.—Please forward us immediately two (2) tons more on our order.

Wason Car and Foundry Co., Chattanooga, Tenn., May 3, 1881.

S. B. Lowe, City:
Dear Sir: For some time past we have been using the Lowe Metallic Paint upon all the cars built at our shops, and, as it gives entire satisfaction to our customers, it is our purpose to continue the use of it. F. F. MORRILL, Sec'y.

Cincinnati, Hamilton & Dayton R. R. Co., Operating the Dayton & Michigan, Cin'ti, Richmond & Chicago, and C. H. & I. R. Rs. W. H. H. Allison, Master Car-Builder. Cincinnati, June 14, 1881.

Lowe's Metallic Paint Co., Chattanooga, Tenn.:
Gentlemen: We have been using your Metallic Paint on freight cars, at our shops, for the last four months, and find it a better paint than we ever used for that purpose.
Yours respectfully, W. H. H. ALLISON.

Laboratory of Fred P. Dewey, Chemist to Roane Iron Co., Chattanooga, Tenn., April 6, 1881.

S. B. Lowe, Esq.:
Dear Sir: I have given samples of your paint ore a careful analysis with a special view of ascertaining if there is any substance in it calculated to prove injurious to tin or iron roofs, and am free to say that I find it remarkably free from sulphides of every kind, or anything else that could prove injurious to either tin or iron roofs. Yours respectfully,
FRED P. DEWEY, Ph. B., Analytical Chemist

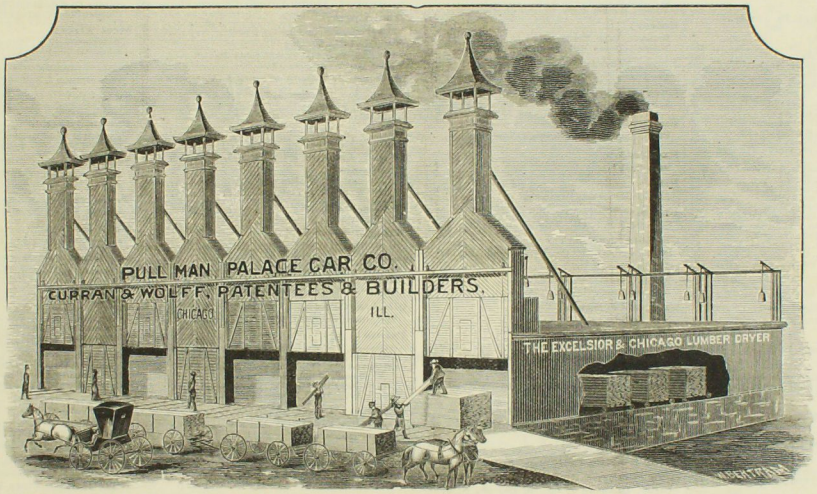
Office of Norton & Wieder, Paints, Oils, Varnishes, Glass, Sash, Doors and Blinds, St. Louis, May 30, 1881.

Lowe's Metallic Paint Co., Chattanooga, Tenn.:
Gentlemen: We have used and sold—in the course of the past year—enormous quantities of your Metallic Paint, and we find that less oil is required for yours than for other Metallic Paints. Yours truly, NORTON & WIEDER.

THE EXCELSIOR AND CHICAGO LUMBER DRYER is Built under 16 Patents.

PAYS FOR ITSELF EVERY YEAR.

Storing Capacity, 40,000 feet Inch Lumber.



DRYING 5,000 FEET PINE LUMBER EVERY 24 HOURS.

RAILROAD COMPANIES AND CAR-BUILDERS WHO AR USING THE EXCELSIOR AND CHICAGO LUMBER DRYER.

	No. of Dryers.
Pullman Palace Car Company, Chicago	8
Wells & French Co., Chicago	3
C. & N. W. Railroad, Chicago	3
Flint & Pere Marquette R. R., Saginaw	1
Peninsular Car Works, Detroit	1
Michigan Car Company, Detroit	2
Memphis & Charleston Railroad, Memphis	1
Ohio Falls Car Company, Jeffersonville, Ind	2
Denver & Rio Grande Railway, Denver, Col	2
U. S. Rolling Stock Co., Chicago	1
Chicago, Burlington & Quincy R. R., Aurora, Ill	
Southern Car Works, Knoxville, Tenn	
Atchison, T. & S. Fe Railway, Topeka, Kan	1
Barney & Smith Company, Dayton, O.	4
Missouri Car & Foundry Co., St. Louis	1
Jackson & Sharp Co., Wilmington, Del	
The Harlan & Hollingsworth Co., Wilmington, Del	
Billmeyer & Small Co., York, Pa	

CURRAN & WOLFF, Proprietors and Builders, 39 and 41 FRANKLIN STREET, CHICAGO, ILL.

AJAX METALS,

Especially Adapted for LOCOMOTIVE, CAR, ROLL-NECK and MACHINERY BEARINGS, and for Pump-Rods, Valves, Plungers, etc., for Mine Use where sulphurous water and acids are found.

LETTERS PATENT have not been taken out, so that any one using our goods runs no risk of being associated with any lawsuit. **NO INTERFERENCE** can be filed against the use of Ajax Metal; on the contrary, letters of recommendation from the leading steel and iron mills, foundries and machine shops of this country are shown upon application. Also reports of tests as made by MASTER CAR-BUILDERS and MASTER MECHANICS, who are acknowledged AUTHORITY. Full information given on application to

GEO. B. CUSHING, 221 Front St., New York; THOMPSON, EPPING & CARPENTER, Pittsburgh; N. F. THOMPSON, Wilmington, N. C.; POST & CO., Cincinnati; M. M. BUCK & CO., St. Louis.

THE ELKINS MANUFACTURING AND GAS CO., 617 and 619 Arch Street, Philadelphia, Sole Manufacturers of AJAX METALS.

HOOKS BRONZE AND COMPOSITION CAR AND LOCOMOTIVE BEARINGS.

HOOKS SMELTING CO.

PHILADELPHIA

MANUFACTURERS AND DEALERS IN RAILWAY SUPPLIES.

INDEX TO ADVERTISEMENTS

IN THE

National Car-Builder.

PAGE

Air Brakes:
Eames Vacuum Air Brake Co., 15 Gold st., N.Y. xii
Westinghouse Air Brake Co., Pittsburgh, Pa. (cover) i

Artificial Leather:
Evans Artificial Leather Co., Boston, Mass. xiii

Axles:
Baugh Steam Forge Co., Detroit, Mich. ix
Midvale Steel Co., Philadelphia vii
New York Steam Forge Co., 46 Courtlandt st., New York vii
Pittsburgh Forge & Iron Co., Pittsburgh, Pa. i
Wilson, Walker & Co., Pittsburgh, Pa. xvi

Bell Cord and Couplings:
Wellington Bros. & Co., Agents, Boston, Mass. xxii

Belt Fastenings:
Thacher & Co., 334 Euclid ave., Cleveland, O. v

Belting:
R. T. Whelpley, Chicago, Ill. (cover) 2

Bicycles:
H. B. Smith Machine Co., Smithville, N. J. xxii

Bolts:
Elba Iron & Bolt Co., Pittsburgh, Pa. vii
Hoops & Townsend, Philadelphia, Pa. ii
Plumb, Burdict & Barnard, Buffalo, N.Y. (cover) 4

Bolt Cutters:
Howard Iron Works, Buffalo, N. Y. viii

Brushes:
Stewart Bros. Co., Pittsburgh, Pa. (cover) 1

Cars:
W. C. Allison, Philadelphia, Pa. viii
Billmyer & Small, York, Pa. viii
Bradley Car Works, Worcester, Mass. viii
J. G. Brill & Co., Philadelphia, Pa. ix
Cleveland Bridge & Car Works, Cleveland, O. ix
Erie Car Works, Erie, Pa. (Limited) ix
Gill Car Manufacturing Co., Columbus, O. viii
J. L. Gill, Jr., Allegheny City, Pa. ix
Harlan & Hollingsworth Co., Wilmington, Del. ix
Harrisburg Car Mfg. Co., Harrisburg, Pa. viii
J. M. Jones & Co., Schenectady, N. Y. viii
Lehigh Car Wheel and Axle Works, Catasauqua, Pa. ix
Litchfield Car and Machine Co., Litchfield, Ill. viii
Michigan Car Co., Detroit, Mich. ix
Middletown Car Works, Middletown, Pa. ix
Pardee Car Works, Watsontown, Pa. ix
Peninsular Car Works, Detroit, Mich. viii
John Stephenson Co. (Limited), New York, N.Y. viii
Southern States Coal, Iron & Land Co. (Limited), South Pittsburg, Tenn. (cover) ix
Wason Manufacturing Co., Springfield, Mass. ix
Wason Car & Foundry Co., Chattanooga, Tenn. viii
Youngstown Car Works, Youngstown, Ohio viii

Car Brake Shoes:
Congdon Brake Shoe Co., Chicago, Ill. xx

Car Brass Grinding Machine:
The Tanite Co., Stroudsburg, Pa. (cover) 4

Car-Door Hangers:
S. H. & E. Y. Moore, Chicago, Ill. xvi

Car Glass:
Holbrook Bros., 87 Beekman st., N.Y. (cover) 1
Theo. W. Morris & Co., 27 Chambers st., N. Y. viii

Carpets.
W. & J. Sloane, New York xx

Car Pushers:
Penfield Block Co., Lockport, N. Y. (cover) 4

Car Seats:
Geo. Bantin & Co., Philadelphia, Pa. viii
Hale & Kilburn Mfg. Co., Phila., Pa. xii

Car Springs:
Chicago Tyre & Spring Works, Chicago, Ill. xxii
Cliff, Richter & Co., 5 Dey st., N. Y. (cover) 1, 3, xvi
Columbia Car Spring Co., 322 Seventh ave., N. Y. (cover) 3
Hebbard Car Spring Co., Knoxville, Tenn. (cover) 3
Diamond State Car Spring Works, Wilmington, Del. (cover) 3
A. French & Co., "Elliptic," Pittsburgh, Pa. i
French Spiral Spring Co., Pittsburgh, Pa. (cov) 3
Detroit Car Spring Co., Detroit, Mich. (cover) 3
J. Jeffries & Son, Philadelphia, Pa. (cover) 3
Keystone Spring Works, Philadelphia, Pa. (cov) 3
National Car Spring Co., 13 Barclay st., N. Y. (cover) 3

Car Stoves:
A. P. Winslow & Co., Cleveland, O. xiii

Car Trimmings:
Dell & J. C. Noblit & Co., Philadelphia, Pa. xxii

Car Trucks:
Thielsen Truck Co., Chicago, Ill. vii

Car Wheels:
Allen Paper Car-Wheel Co., 240 B'y, N. Y. vi
Andrews & Cooney, New York
Bowler & Co., Cleveland, O. vi
Cayuga Wheel & Foundry Co., Waverly, N. Y. vii
Davenport, Fairbairn & Co., Erie, Pa. vi
Detroit Car Wheel Co. ix
The Gill Car Manufacturing Co., Columbus, O. iv
Lobdell Car-Wheel Co., Wilmington, Del. vi
Maher & Brayton, Cleveland, O. vi
Mowry Car Wheel Works, Cincinnati, O. vii
Paige's Wrought Metal Car Wheel Co., Springfield, Mass. vii
Ramapo Wheel & Foundry Co., Ramapo, N. Y. vi
Lehigh Car, Whl & Axle Wks, Catasauqua, Pa. v
Taylor Iron Works, High Bridge, N. J. vii
Wason Mfg. Co., Springfield, Mass. vi
A. Whitney & Sons, Philadelphia, Pa. vi

Cement (Portland and Rosendale):
S. L. Merchant & Co., Broadway, N. Y. (cover) 4

Chains:
Union Chain Works, Pittsburgh, Pa. xx

Chilled Car-Wheel Grinding Co:
Carson, Nev., and 246 S. Clark st., Chicago, Ill. vi

Curled Hair and Glue:
Baeder, Adamson & Co., New York (cover) 4
Mellen & Co., 144 Worth st., N. Y. ix

Desks:
A. H. Andrews & Co., Chicago, Ill. ii

Deflectors:
Globe Ventilator Co., Troy, N. Y. xix

Draw-Bars:
Cont. Draw-Bar Co., 945 Ridge ave., Phila., Pa. xiv
Pittsburgh Forge & Iron Co. i
J. B. Safford, Buffalo, N. Y. ii
Wilson, Walker & Co., Pittsburgh, Pa. xvi

Emery:
Henry A. Page, Boston, Mass. xx
Walpole Emery Mills, Boston, Mass. v

Emery Wheels:
The Tanite Co., Stroudsburg, Pa. (cover) 4

Encaustic Tiling:
S. L. Merchant & Co., 41 Broadway, N. Y. v

Engraving:
Photo-Eng'g Co. (Park Place, New York) xvi

Excavators:
Industrial Works, Bay City, Mich. xiii

Files:
American File Co., Pawtucket, R. I. xxi

File-Sharpening:
Sand Blast F. S. Co., Wilmington, Del. (cover) 1

Flexible Shafting:
Stow Flexible Shaft Co., Philadelphia, Pa. xiii

Forges:
Empire Portable Forge Co., Cohoes, N. Y. vii
Hoit Manufacturing Co., Cleveland, Ohio vii

Frogs & Crossings:
H. & H. Elliot, East St. Louis, Ill. ii
Union Switch & Signal Co. (cover) 1

Glass Chimneys (Car Lamp and Head Light):
New England Glass Works, Boston, Mass. ii

Hand-Car:
Sheffield Velocipede, H. W. Peabody & Co., Boston, Mass. xxii

Hoisting Engines and Boilers:
H. G. Wormer & Co., Chicago, Ill. (cover) 2

Hydraulic Jacks:
R. Dudgeon, 24 Columbia st., New York xi
Philip S. Justice, Philadelphia, Pa. viii

Inks (Writing):
Carter, Dinsmore & Co., 36 Dey st., N. Y. (cover) 2

Injectors:
"Hancock Inspirator Co.," Boston, Mass. vii
"Monitor," Nathan & Dreyfus, N. Y. xiii
Wm. Sellers & Co., Philadelphia, Pa. xiii
Nat. Tube Wks., New York, Boston and Chic. xii

Interlocking Switches:
Union Switch & Signal Co. (cover) 1

Iron:
Ewald Iron Co., St. Louis, Mo. xii

Journal Bearings:
J. Fitzsimmons, Manganese Bronze, Pittsburgh, Pa. xx
George R. Mencely & Co., West Troy, N. Y. (cover) 2
Granular Metal Co., Boston, Mass. xxiv
Hook's Smelting Co., Philadelphia, Pa. iii
D. A. Hopkins, 113 Liberty st., N. Y. xvi
Leroy Journal Bearing Co., New York (cover) 2
Phosphor-Bronze Smelting Co., Philadelphia, Pa. (Limited) xi

Journal Box Lids:
Hewitt Box Lid Cover Co., Chicago, Ill. xiv

Leather:
C. R. Yandell & Co., New York (cover) 1

Lifting Jack:
Joyce, Cridland & Co., Dayton, O. xi

Locomotives:
Baldwin Loco. Works, Philadelphia, Pa. xii
Danforth Loco. & Mach. Co. Paterson, N. J. xii
Manchester Loco. Wks, Manchester, N. H. xii
Pittsburgh Loco & Car Wks., Pittsburgh, Pa. xii
Rogers Loco. & Mach. Wks, Paterson, N. J. xii
Schenectady Locomotive Works, N. Y. xii

Locomotive Tubes:
Nat. Tube Works, Boston, Chicago and N. Y. xii

Locomotive Tyres:
Chicago Tyre & Spring Works, Chicago, Ill. xxii

Lubricants:
A. Bridges, 46 Cortlandt St., N. Y. v
Eagle Car-Box Lub. Co., New York v
A. Middleton, 945 Ridge ave., Philadelphia, Pa. v
Mica Man'f'g Co., Cleveland and New York v

Lubricators:
Detroit Lubricator Co., Detroit, Mich. v

Lumber:
Adams & Lord, Chicago, Ill. viii
Berthold & Jennings, St. Louis, Mo. viii
Shepard & Morse, Boston, Mass. viii
The Soper & Pond Co., Chicago, Ill. viii
W. R. Burt, Buffalo, N. Y. xxii
Vanderbilt & Hopkins, 120 Liberty st., N. Y. viii

Lumber Dryer:
"Excelsior," Curran & Wolff, Chicago, Ill. iii

Machinists:
Westinghouse Machine Co. (cover) 1

Machinists Tools:
Wm. Sellers & Co., Philadelphia, Pa. v
Niles Tool Works, Hamilton, O. xi

Mahogany, Fancy Woods & Veneers:
The E. D. Albro Co., Cincinnati, O. (cover) 2
John R. Graham, New York viii
J. H. Monteath, 151 Centre street, New York viii
Palmer, Parker & Co., Boston, Mass. (cover) 4
J. Rayner, New York City x
Geo. W. Read & Co., 186 Lewis st., N. Y. i
Hugh Shiels & Co., Cincinnati, O. xiv
Wm. E. Uptegrove & Bro., New York City ii

Marqueterie:
J. Bernard, 161 Greene st., N. Y. viii
Chas. W. Spurr, Boston, Mass. ii

Metals, "Ajax":
Eakins Mfg. Co., Philadelphia, Pa. iii

Mineral Wool:
U. S. Mineral Wool Co., New York City iv

Oils:
Galena Oil Works (Limited), Franklin, Pa. v
Niagara Refining Co., Buffalo, N. Y. xi
Signal Oil Works, Franklin, Pa. v

Oil-Box Covers:
Vulcanized Fibre Co., Wilmington, Del. xi

Paints:
"Cement," Cary, Ogden & Parker, Chic., Ill. x
Iron Clad Paint Co., Cleveland, O. (cover) 2
Cleveland Iron Ore Paint Co., Cleveland, O. xxii
J. W. Masury & Son, New York xi
Lowe's Metallic Paint Co., Chattanooga, Tenn. iii
Prince Mfg. Co., 71 Maiden Lane, N. Y. (cover) 2

Pig Iron:
Detroit Iron Furnace Co. ix

Plate Planer:
Hilles & Jones, Wilmington, Del. xxii

Power Hammers:
Bradley & Co., Syracuse, N. Y. ii
S. C. Forsaith & Co., Manchester, N. H. vii

Power Punches, Shears and Hammers:
The Lang & Allstatter Co., Hamilton, O. vii

Pumps:
Cope & Maxwell Mfg. Co., Hamilton, O. xx
Crane Bros. Mfg. Co., Chicago, Ill. xxii
Dunsey & Co. (Limited), Seneca Falls, N. Y. vii
Smith, Vaile & Co., Dayton, O. xx
Valley Machine Co., Easthampton, Mass. xx
H. R. Worthington, 239 B'way, N. Y. (cover) 2

Railroad Supplies:
R. L. Leach, Boston, Mass. xxii
Ewing, Mitchell & Co., Pittsburgh, Pa. xiii
Hooks Smelting Co., Philadelphia, Pa. iii
Thayer, Dunham & Ross, Boston, Mass. v
L. G. Tillotson & Co., 5 and 7 Dey st., N. Y. (cov) 4
Post & Co., Cincinnati, O. (cover) 4

Railroad & Machinist Supplies:
Campbell & Lill, Chicago, Ill. (cover) 2

Railway Car and Locomotive Forgings:
Pittsburgh Forge & Iron Co. i
Wilson, Walker & Co., Pittsburgh, Pa. xvi

Railway Fastenings:
Morris Sellers & Co., Chicago, Ill. vii

Rochester Machinery Manufacturing Co.
H. G. Wormer & Co., Chicago, Ill. (cover) 2

Roofing:
Indiana Car Rubber Roofing Co., Indianapolis, Ind. xiii
Porter Iron Roofing Co. (cover) 4

Rubber Goods:
R. T. Whelpley, Chicago, Ill. (cover) 2

Safety-Nut:
Atwood Safety-Nut Co., Springfield, Mass. vii

Safety Valves:
Ashton Valve Co., Boston, Mass. xii

Sand Paper and Emery Cloth:
Baeder, Adamson & Co. (cover) 4

Sash Balances—"Anderson's:"
O. K. Gardiner, Pittsburgh, Pa. xxii

Sash Locks:
Universal Sash Lock Co., Albany, N. Y. (cover) 2

Shafting:
Wm. Sellers & Co., Philadelphia, Pa. v

Sheet-Iron:
A. A. Thompson & Co., Water street, N. Y. xiii
W. D. Wood & Co., Pittsburgh xx

Sligo Stay-Bolt Iron:
Phillips, Nimick & Co., Pittsburgh, Pa. xiii

Steel:
Chrome Steel Works, Brooklyn, N. Y. (cover) i
Midvale Steel Co., Philadelphia, Pa. vii

Steel Castings:
Eureka Cast-Steel Co., Philadelphia, Pa. (cover) 4
Chester Steel Castings Co., Philadelphia xx

Steel Tires:
Midvale Steel Co., Philadelphia, Pa. vii
Standard Steel Works, Philadelphia, Pa. vi

Switch Stands:
Union Switch & Signal Co. (cover) 1

Switches:
Union Switch & Signal Co. (cover) 1

Tackle Blocks:
Bagnall & Loud, Boston, Mass. ii
Penfield Block Co., Lockport, N. Y. v

Taps and Dies:
Morse Twist Drill Co., New Bedford, Mass. viii
The Pratt & Whitney Co., Hartford, Conn. (cover) 4

Track Tools:
M'calf, Paul & Co., Pittsburgh, Pa. (cover) 2

Tripoli:
Georgia Mining & Mfg. Co., N. Y. City ii

Tin Plate and Metals:
Merchant & Co., Philadelphia, Pa. xx

Varnishes:
John Babcock & Co., Boston, Mass. x
Berry Brothers, Detroit, Mich. xiv
Clarence Brooks & Co., New York xi
Burbank, Ryder & Damon, Boston, Mass. (cover) i
Moses Bigelow & Co., Newark, N. J. x
F. W. Devoe & Co., New York x
Felton, Rea & Sibley, Philadelphia, Pa. v
Murphy & Co., N. Y. City and Cleveland, O. x
J. W. Masury & Son, New York xi
Parrott Varnish Co., Bridgeport, Conn. (cover) 4

Veneers, Papered:
Chas. W. Spurr, Boston, Mass. ii

Ventilators:
Globe Ventilator Co., Troy, N. Y. xi
Adams & Westlake Manufacturing Co. xx

Waste (Cotton and Woolen):
National R'y Patent Waste Co., New York (cover) 1

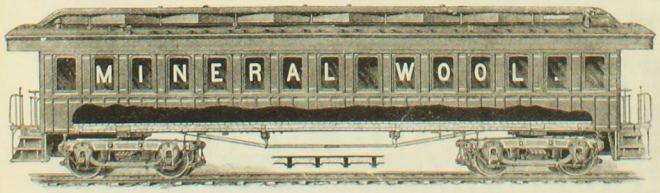
Watchman's Time Detector:
J. E. Buerk, Boston xiv

Water Supply:
E. C. Leffell, Springfield, Ohio ii
Eclipse Wind Engine Co., Beloit, Wis. xxii

White Lead:
John Jewett & Sons, 181 Front street, N. Y. xiv
J. T. Lewis & Bros., Philadelphia, Pa. v

Wire Fence:
A. J. Adam, Joliet, Ill. xx
American Fencing Co., New York (cover) 2
Thorn Wire Hedge Co., Chicago, Ill. (cover) 4
Western Fence Co., Chicago, Ill., contractors (cover) 4

Wood-Working Machinery:
Benjamin Fischer & Mallery, Chicago, Ill. xxii
Bentel, Margedant & Co., Hamilton, O. xx
Martin Buck, Lebanon, N. H. vi
Cordesman, Egan & Co., Cincinnati, O. ix
S. C. Forsaith & Co., Manchester, N. H. (cover) 2
G. A. Gray, Cincinnati, Ohio xiii
Goodell & Waters, Philadelphia, Pa. viii
Lane, Bodley & Co., Cincinnati, O. vii
H. A. Lee, Worcester, Mass. xvi
McIver Bros. & Co., Worcester, Mass. viii
C. B. Rogers & Co., Norwich, Conn. xx
Rollstone Machine Co., Fitchburg, Mass. ii
Witherby, Rugg & Richardson, Worcester, Mass. (cover) 4



As a filling for floors of passenger cars, this material prevents the loss of heat, deadens the sound and lowers the center of gravity of the car. More effective than shavings of double the thickness and entirely fireproof. Valuable also for covering all heated surfaces. Only $6 per 100 sq. feet, filling 3 inches thick. Sample and circular free by mail.

U. S. Mineral Wool Co.,
16 CORTLANDT ST., NEW YORK.

JOHN T. LEWIS & BROS. WARRANTED PURE WHITE LEAD. PHILADA.

TRADE MARK.

Manufacturers of Genuine Lead, Red Lead, Litharge, Orange Mineral, Linseed Oil and Painters' Colors.

No. 231 South Front Street.

Important to Railroad Managers and Master Mechanics.

SIBLEY'S PERFECTION VALVE OIL.

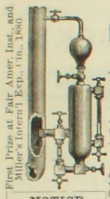
More perfect lubrication insured, and entire freedom guaranteed from corrosion of cylinders and destruction of steam joints by fatty acids.

In exclusive use on 50 railroads.

References and prices furnished upon application.

☞ Make exclusive specialty of the Manufacture of Valve and Signal Oils for Railroad use.

SIGNAL OIL WORKS,
FRANKLIN, PA.
J. C. SIBLEY, President.



First Prize at Paris, Amer. Inst., and Philadelphia Exp. 1876, 1880.

THE DETROIT
Lubricator Mfg. Co.'s
CONTINUOUS FEED
LUBRICATOR CUPS

For oiling valves and cylinders of steam engines, by the only perfect method,

Through the Steam Pipe.

The oil passes *in sight*, drop by drop, into the column of steam, where it vaporizes, thus becoming a *steam tube coat*, oiling perfectly every part reached by the steam. Any *clean oil*, black or white, light or heavy, may be used. Saves from 50 to 90 per cent in oil and wear of machinery, thus paying for itself several times a year. A cup will be sent to responsible parties on 30 days' trial if desired. In ordering give diameter of cylinder. Address

DETROIT
LUBRICATOR MFG. CO.
Office, 89 Griswold St.,
DETROIT, MICH.

NOTICE.

The first Lubricators ever made, showing the oil passing drop by drop thro' a transparent water chamber were devised by us, and the same are fully embraced by many Letters Patent owned and controlled by us. Lubricators of every nature embodying the above feature, made by other parties, are encroachments upon our rights, and we will hold purchasers and users, as well as manufacturers, responsible in damages for such violations.

NOTE.—In our recent suit against the American Lubricator Co., of Detroit, before Justice Stanley Matthews of the U. S. Supreme Court, involving their "sight feed" feature, a decree was rendered in our favor Aug. 20, 1881.

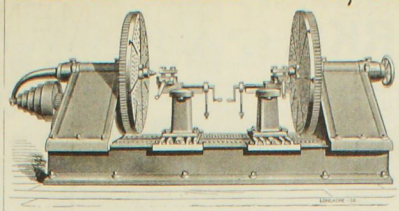
Please mention this paper.

THE STANDARD LUBRICATING OIL
OF AMERICA
FOR RAILROADS.
GALENA
ENGINE, COACH AND CAR OIL.
Gravity, 26°, 27°, 28°, 29°. Cold Test, 10° to 15° below zero.

No freezing in coldest weather, and entire freedom from hot journals at any time, as its exclusive use upon a majority of the leading railroads has demonstrated.

Showing Better Results than any Oil Extant.
REFERENCES FURNISHED ON APPLICATION.
GALENA OIL WORKS (Limited),
FRANKLIN, PA.

WILLIAM SELLERS & CO., PHILADELPHIA,



Iron and Steel Working Machine Tools, for Railways, Machine Shops, Rolling Mills, etc.
TURN-TABLES, PIVOT BRIDGES, SHAFTING.

BRANCH OFFICE, 79 LIBERTY STREET, NEW YORK.

228 Hudson Street, New York. THE 346 Euclid Avenue, Cleveland, O.

MICA MANUFACTURING CO.,
SOLE MAKERS OF THE FAVORITE
Improved Mica Car Grease
AND ALL GRADES OF CAR, AXLE AND ROLLING-MILL GREASES

☞ Correspondence invited and sample barrels cheerfully furnished for trial.

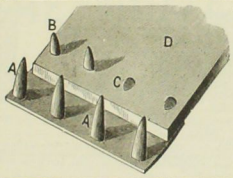
31 Michigan Avenue, Chicago, Ill. 508 Delaware Street, Kansas City, Mo.

DENISON'S PATENT COOLING AND LUBRICATING COMPOUND,
FOR COOLING AND LUBRICATING HOT JOURNALS.

DIRECTIONS.—For cars or engines, pack the box so that the Compound will come in contact with the bearing and journal, using waste saturated with oil; also moisten the Compound with oil. For shafting and places where waste can not be used, mix the Compound with oil, and apply to the bearing. If the bearing be very hot, the first application may run off, but two or three applications will cool it. When a journal is hot, don't cool it with water, but apply the Compound; **and no matter how hot it is, it will cool it while in motion.** When you apply new bearings, fill them with the Compound before putting them on the axle and pack the sides of the box next to the bearing with the Compound, and your boxes will run cool. **For Sale by**

ALLEN MIDDLETON, 945 Ridge Ave., Phila. C. A. SMITH, 113 Liberty St., N.Y.

PURE TURKISH EMERY.
Quartz, Pumice and Rotten Stone, Crocus, Rouge, Glue, Sand Paper, Emery Paper and Cloth, Emery Wheels, &c., &c., &c.
WALPOLE EMERY MILLS,
MILLS, South Walpole. OFFICE AND STORE, 114 MILK STREET, BOSTON.
Purchasing Agents furnished with sample cases upon application



THACHER'S PATENT BELT FASTENERS.
CHEAP, DURABLE, EASILY APPLIED.
FOR SAMPLES AND TERMS APPLY TO
THACHER & CO., Manufacturers,
No. 334 Euclid Ave.,
CLEVELAND - - - OHIO.

FELTON, RAU & SIBLEY,
136, 138 & 140 North 4th St., Philadelphia, Pa.,
MANUFACTURERS OF
FINE RAILWAY VARNISHES AND PAINTS
Smoke-Stack Black, and Colors Prepared for Passenger and Freight Cars, Specialties.

Thayer, Dunham & Ross,
50 BROAD STREET, BOSTON,
MANUFACTURERS' AGENTS
RAILROAD SUPPLIES.
NEW ENGLAND AGENTS
AJAX METALS, FOR RAILROAD JOURNAL BEARINGS.
RAILROAD OILS A SPECIALTY.

EAGLE CAR-BOX LUBRICATOR COMPANY.
NO MORE HOT BOXES!

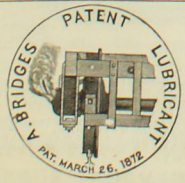
We can give the highest of references, including some of the best roads in the United States. We claim that our compound is a perfect cooler; saves brasses, and trouble and annoyance of frequent greasing. This is abundantly proved by our continual orders from railway companies, who are deriving the greatest satisfaction from its use.

TRADE MARK.

We sell in quantities of from five barrels to car loads and no charge is made unless it proves satisfactory.

We also manufacture the EAGLE MACHINERY AND CUP COMPOUND, which takes the place of Sperm and Lard Oil. It has been tested in Navy Yards and Engine and Machine Shops. Pamphlets explain further.

Address A. G. MANDEL, General Manager, P. O. Box 2555; Office, 26 Burling Slip, New York.



HOT JOURNALS ENTIRELY PREVENTED.
BRIDGES' LUBRICANT
FOR RAILROAD CAR JOURNALS AND OTHER BEARINGS.
SAMPLES FURNISHED GRATIS. SEND FOR CIRCULAR.
Manufacture Ball's Telescopic Screw Jack.
JOHN S. URQUHART, Successor to
ALBERT BRIDGES, 46 CORTLANDT STREET, NEW YORK.

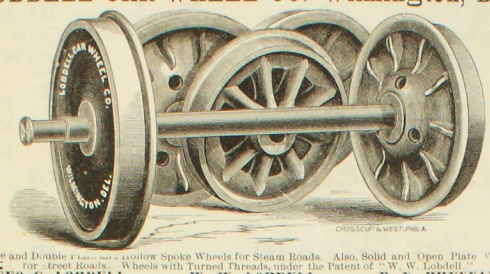
ESTABLISHED 1847.

A. WHITNEY & SONS'

CAR WHEEL WORKS,

PHILADELPHIA.

LOBDELL CAR WHEEL CO. Wilmington, Del.

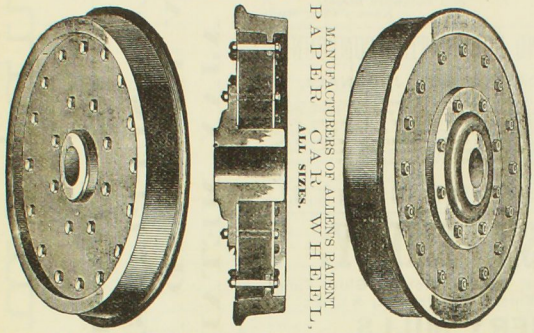


Single and Double Plate and Hollow Spoke Wheels for Steam Roads. Also, Solid and Open Plate Wheels for Street Roads. Wheels with Turned Threads, under the Patent of "W. W. Lobdell."

GEO. G. LOBDELL, President. W. W. LOBDELL, Secretary. P. N. BRENNAN, Treasurer.

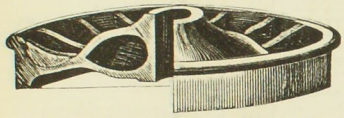
ALLEN PAPER CAR WHEEL COMPANY.

General Offices: 240 Broadway, N. Y.



Especially adapted for Sleeping and Drawing-Room Cars, Locomotive and Tender Trucks. Steel Tire with Annular Wet—Strongest, Most Durable, and Most Economical Wheel in use. Works at Hudson, N. Y.; and at Pullman near Chicago, Ill.

A. G. DARWIN, President. J. C. BEACH, Treasurer. C. H. ANTES, Secretary.



WASON MANUFACTURING CO.,

SPRINGFIELD, MASS.

BUILDERS OF

RAILWAY CARS OF ALL DESCRIPTIONS,

CAR WHEELS AND RAILWAY CASTINGS.

H. S. HYDE, Treasurer. G. C. FISK, President.

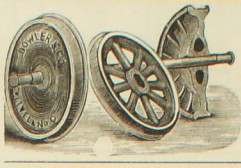
DAVENPORT, FAIRBAIRN & CO.,

ERIE, PA.

MANUFACTURERS OF

CAR WHEELS.

Capacity 350 Wheels per day. Wheels made by improved process. Far more durable than those made in the ordinary way.



CLEVELAND FOUNDRY.

Car Wheels of All Kinds and Sizes

WITH OR WITHOUT AXLES.

CHILLED-FACED RAILROAD FROGS

Street Railroad Turnouts.

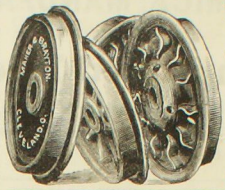
ROLLING MILL AND MACHINERY CASTINGS

Nos. 9, 11 and 13 Winter St., Cleveland, O.

BOWLER & CO.

CLEVELAND WHEEL AND FOUNDRY WORKS,

MAHER & BRAYTON, Proprietors.



MANUFACTURERS OF

CAR, ENGINE, TRUCK AND TENDER WHEELS RAILROAD, ROLLING-MILL AND MACHINERY CASTINGS, AND STREET RAILROAD WHEELS AND TURNOUTS.

ALSO,

CHILLED-FACED RAILROAD FROGS.

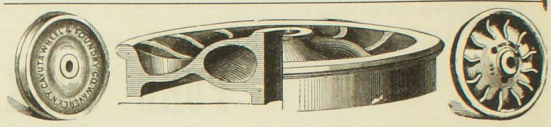
Office: 20 Carter Street.

Works: Cor. Carter and Collins Streets, Cleveland, O.

THE STANDARD STEEL WORKS.

LOCOMOTIVE & CAR WHEEL **TIRES.**

220 S. FOURTH ST., PHILADELPHIA.



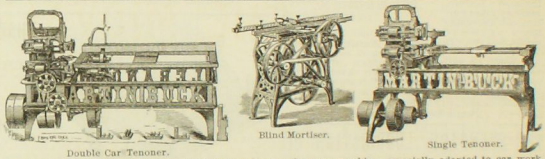
RAMAPO WHEEL AND FOUNDRY COMPANY,

MANUFACTURERS OF

Chilled Wheels for Drawing-Room and Sleeping Coaches, Locomotives, Tenders, Passenger and Freight Cars.

GEO. CHURCH, President and Treasurer. W. W. SNOW, Superintendent and General Manager

RAMAPO, ROCKLAND COUNTY, N. Y.



Double Car Tenoner. Blind Mortiser. Single Tenoner.

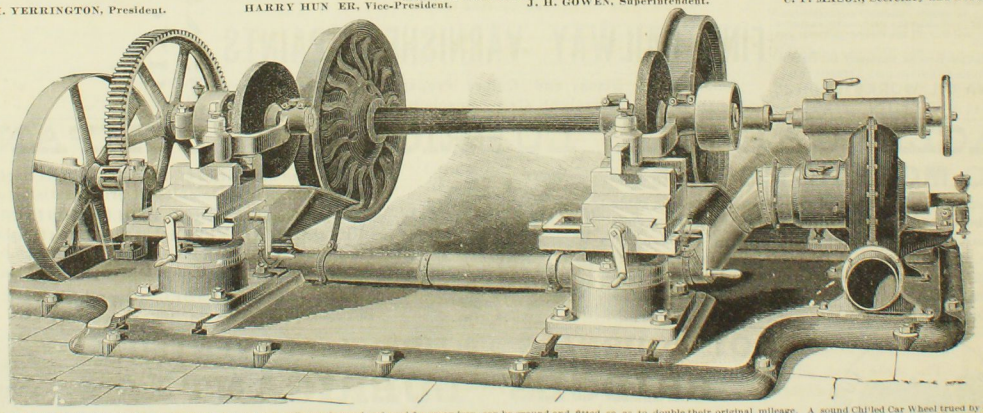
Single, Double and Triple Tenons and Gaining done on the same machine; especially adapted to car work. Single Tenoners of iron, with carriage mounted on trucks; Blind Mortiser and Borer combined for fixed and rolling slats; Adjustable Groover Heads, and a full line of Wood-working Machinery.

MARTIN BUCK, Lebanon, N. H.

CHILLED CAR WHEEL GRINDING COMPANY.

Patented in United States and Canada.

H. M. YERRINGTON, President. HARRY HUNTER, Vice-President. J. H. GOWEN, Superintendent. C. P. MASON, Secretary and Treasurer.



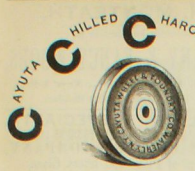
Wheels with flat places and otherwise badly worn, that are ordinarily condemned and used for scrap iron, can be ground and fitted so as to double their original mileage. A sound Chilled Car Wheel trued by our method cannot be excelled by a paper or any other description of Car Wheel with steel tire. Allowing all new wheels to be 33½ inch oval, if properly fitted to axles, our machine *will* true up one pair an hour. We manufacture, expressly for use with our machine, Abrading Wheels, which, as the result of a series of experiments and long experience, we guarantee to be the best grinding wheels made. No odor, no glaze, and we defy competition. The machines are in use on the

CENTRAL PACIFIC RAILROAD,
CHICAGO & NORTHWESTERN RAILWAY,
CHICAGO, ROCK ISLAND & PACIFIC R'WAY,
VIRGINIA & TRUCKEE RAILROAD,
UNION PACIFIC RAILWAY (DENVER & SOUTH PARK DIVISION),
SOUTH PACIFIC COAST RAILROAD,
NEVADA COUNTY NARROW GAUGE RAILROAD,
ALLEGHENY VALLEY RAILROAD,
CHICAGO CITY RAILWAY (WEST DIVISION),
CARSON & COLORADO RAILROAD,
LAKE TAHOE NARROW GAUGE RAILROAD,
PENNSYLVANIA RAILROAD, DENVER & RIO GRANDE RAILWAY, CHICAGO, MILWAUKEE & ST. PAUL RAILROAD, CANADIAN PACIFIC RAILROAD (YALE B. C.), CHICAGO CITY RAILWAY (SOUTH DIVISION), NEW YORK, ONTARIO & WESTERN RY.

We are prepared to sell machines outright, or to furnish on them royalty for each pair of wheels trued. Address

CHILLED CAR WHEEL GRINDING COMPANY, CARSON, NEVADA.

Or 246 South Clark Street Chicago, Ill.

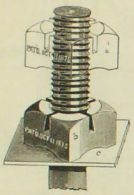


MANUFACTURED BY
CAYUTA WHEEL AND FOUNDRY CO.,
WAVERLY, N. Y.
M. LYMAN, Jr., Superintendent and Treasurer
L. H. TAYLOR, Pres. S. P. RABER, Sup't
J. H. WALKER, Sec. and Treas.

TAYLOR IRON WORKS,
High Bridge, N. J.,
MANUFACTURERS OF
Chilled Iron Car-Wheels, Steel-Tired Wheels, Car and Locomotive Axles and Draw Hooks.

LANE & BODLEY CO.,
JOHN AND WATER STREETS,
CINCINNATI,
Manufacturers of their perfectly graduated stroke
Power Mortising Machine
FOR
Car Work, Shafting, Hangers, Pulleys, Couplings and Gearing.
Send for Illustrated Catalogue.

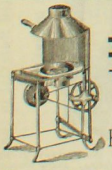
Atwood Safety Nut Co., Springfield, Mass.



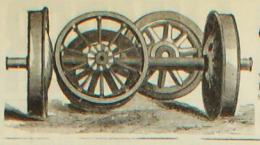
J. W. LARABEE, Treasurer.

a, ATWOOD NUT on bolt without bearing on base—slots open.
b, ATWOOD NUT turned to bearing *c*, partially closing the slots and grasping the bolt.

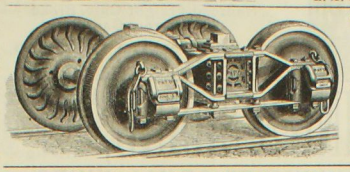
ELBA IRON & BOLT CO.
(LIMITED),
MANUFACTURERS OF
Merchant Bar Iron,
SKELP IRON,
SPLICE BARS, RAILWAY TRACK BOLTS, CAR, BRIDGE AND MACHINERY BOLTS, NUTS, ETC.
WORKS:
ELBA STATION, B. & O. R. R.,
TWENTY-THIRD WARD.
Office: Cor. SMITHFIELD & WATER STS.,
PITTSBURGH, PA.



HOLT FORCES
The Cheapest, The Best.
MANUFACTURED BY
Holt Manufacturing Co.,
CLEVELAND, OHIO.
New York Office, 79 & 81 Reade St.
F. PORTER THAYER Manager.

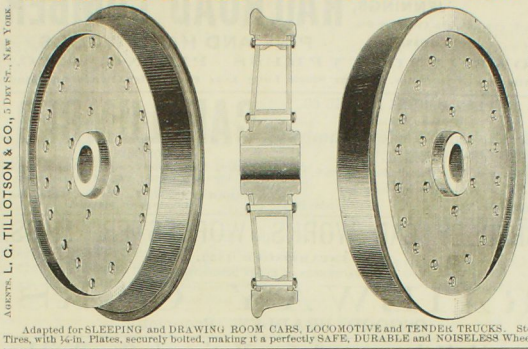


MOWRY
CAR WHEEL WORKS,
CINCINNATI, O.
Manufacturers of CAR WHEELS of all descriptions, Wheels and Axles, Chilled Tires; Engine, Car and Bridge Castings, of any pattern, furnished to order at short notice. Wheels of all sizes constantly on hand.
OFFICE: No. 27½ W. Third St., Cincinnati, O.
WORKS: Eastern Avenue and Lewis Street.
L. A. GREEN, Sup't, Cincinnati, O.



THE THIELSEN TRUCK CO.,
142 Dearborn St.,
CHICAGO, ILL.
We respectfully refer you to the following railroads using this Truck:
R. & D.; K. C., St. J. & C. B.; M. R., F. S. & G.; C., B. & Q.; C., A. & St. L.; A., T. & S. F.; A. & N.; K. P., F. & P. M.; M. C.; St. L., I. M. & S.; B. & M. R. (in Neb.); D. P.; L., E. & G.; C. V.; S. C.; Baldwin Locomotive Works.

PAIGE'S WROUGHT METAL CAR WHEEL COMPANY.
Office, 18 and 20 Hampden St., Springfield, Mass.
MANUFACTURERS OF PAIGE'S PATENT WROUGHT METAL WHEELS.



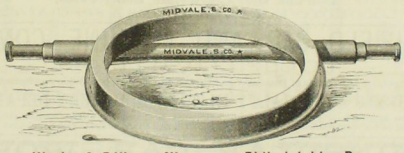
AGENTS, L. G. TILLOTSON & CO., 5 DEY ST., NEW YORK.
AGENTS, SHERBURNE & CO., 80 WATER ST., BOSTON, MASS.

Adapted for SLEEPING and DRAWING ROOM CARS, LOCOMOTIVE and TENDER TRUCKS. Steel Tires, with ¾-in. Plates, securely bolted, making it a perfectly SAFE, DURABLE and NOISELESS Wheel.

NEW YORK STEAM FORGE CO.
MANUFACTURERS OF
HAMMERED CAR AXLES,

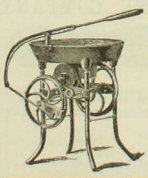
AND OTHER FORGINGS.
Works, 528 to 540 West 16th St. Office, 46 Cortlandt St., New York. ALBERT H. KING, Pres.

THE MIDVALE STEEL CO

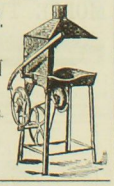


A. G. TOMPKINS & CO., Boston.
H. A. ROGERS, New York.
W. P. BALLARD & CO., New York.
MANNING, MAXWELL & MOORE, N. Y.
CHERAR, ADAMS & CO., Chicago.
POST & CO., Cincinnati.
W. & A. G. SEMPLE, Louisville.
E. H. LINLEY, St. Louis.
SMITH & RAPY, Richmond.

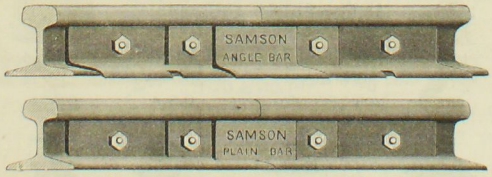
Works & Office: Nicetown, Philadelphia, Pa.
TIRES AND AXLES OF EVERY DESCRIPTION.
HEAVY CASTINGS AND FORGINGS.



Portable Forges and Hand Blowers.
THE EMPIRE, WITHOUT BELTS. DEAD CENTER OR BACK MOTION.
THE WESTERN WITH BELTS AND LEVER HANDLE. CHEAPEST MADE.
SEND FOR CIRCULAR TO
EMPIRE PORTABLE FORGE CO.,
COHOES, N. Y.



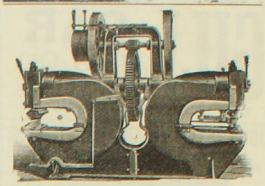
CHICAGO SPLICE BAR MILL.
MORRIS SELLERS & CO., Sole Proprietors and Manufacturers of the Celebrated "SAMSON" BAR



And Every Variety of Plain and Angle Splice Bars.
OFFICE, 6 ASHLAND BLOCK..... Mill, Chicago Ave. and the River..... CHICAGO.

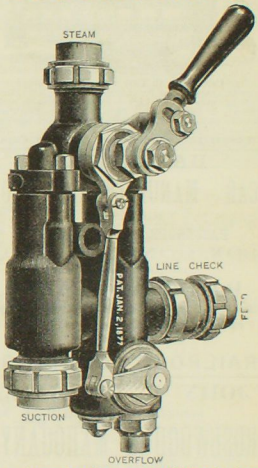
THIS HAMMER
AWARDED THE FIRST PREMIUM OF A SILVER MEDAL
AT THE
American Institute Fair,
N. Y. CITY, NOV., 1873.

Superior in every point to any modification of the Trip Hammer. Simple, Powerful, Efficient and Cheap. Four sizes now being built. For Prices and Descriptive Circulars, address the manufacturers.
S. C. FORSAITH & CO.,
Manchester, N. H.,
who are also builders of the
Abbe Bolt-Heading Machine.



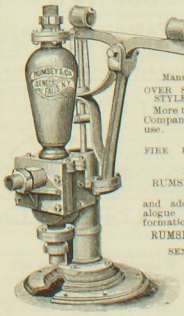
Power Punches, Shears & Hammers.
We make over 100 sizes of Puncnes and Shears. Double and Single, varying from 500 to 30,000 pounds in weight, and adapted forevery variety of work. The Double machines are equal to two Single ones, as each side is worked independently. Also
ADJUSTABLE HELVE CUSHIONED HAMMERS
Of all sizes, Unequaled for Efficiency and Durability.
THE LONG & ALLSTATTER CO.,
Hamilton, O.

THE IMPROVED
HANCOCK INSPIRATOR
FOR
LOCOMOTIVES.



Send for Circulars and Full Particulars to
THE HANCOCK INSPIRATOR CO.
34 BEACH STREET,
Boston, Mass.

RUMSEY & CO. [Limited],



Seneca Falls, NEW YORK,
Manufacturers of
OVER 80 DIFFERENT STYLES OF PUMPS.
More than 50 Railway Companies have them in use.
ALSO
FIRE ENGINES, ETC., ETC.
ASK FOR
RUMSEY'S PUMPS,
and address for Catalogue and full information,
RUMSEY & CO.,
SENECA FALLS,
NEW YORK.

WASON CAR & FOUNDRY CO.

CHATTANOOGA, TENN.,

MANUFACTURERS OF

FREIGHT CARS,

CAR WHEELS,

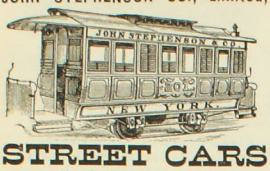
AND

CASTINGS OF ALL KINDS.

GILL CAR M'F'G CO., Columbus, Ohio.

Make the best CARS and WHEELS.

JOHN STEPHENSON CO., Limited,



STREET CARS

And Omnibuses,

47 East Twenty-Seventh St., N. Y.

J. M. JONES & CO.,

SCHENECTADY, NEW YORK.

(Established Over 40 Years.)

Our Cars have all Late and Valuable Improvements. Are noted for Light Running and Easy Riding. Combining Lightness and Strength with Beauty in Design and Finish. Our large Facilities Enable us to Fill Orders Quickly and at the Lowest Prices for Superior Quality.

Manufacturers of Street Railway Cars.

HARRISBURG CAR MANUFACTURING CO.

MANUFACTURE

PASSENGER, MAIL, BAGGAGE,

BOX, GONDOLA, COAL

AND ALL OTHER KINDS OF

RAILROAD CARS;

Railroad Car Wheels and Castings, Bridge and Rolling Mill Castings, Bridge Rods, Bolts and

RAILROAD FORGINGS.

JOHN R. GRAHAM,

IMPORTER AND DEALER IN

ROSEWOOD & MAHOGANY,

AND ALL OTHER

FOREIGN AND DOMESTIC

CABINET WOODS,

SUITABLE FOR CAR WORK.

Cor. 11th Ave. and 30th St.

NEW YORK.

CAR SEATS.

GEORGE BUNTIN & CO.,

SOLE MANUFACTURERS OF

Buntin's Patent Car Seats,

AND NICKEL PLATED ARM CAPS, IN USE ON RAILROADS GENERALLY.

NO. 1,042 Ridge Ave., PHILADELPHIA.

E. W. VANDERBILT. E. M. HOPKINS.

VANDERBILT & HOPKINS,

RAILROAD TIES, CAR AND RAILROAD LUMBER, WHITE AND YELLOW PINE AND OAK,

No. 120 Liberty St., N. Y.

Also North Carolina Pine Boards. Plank and Dimension Lumber to Order.

GENERAL RAILROAD SUPPLIES.

J. BERNARD.

MANUFACTURER OF

Marqueterie of every description; dealer in French Walnuts, Colored and any other Veneers, especially adapted for Car-Work.

161 Greene Street, N. Y.

THE SOPER & POND CO.

Cor. 22d & Loomis Sts.,

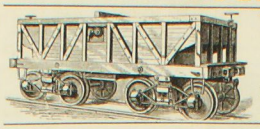
CHICAGO, ILL.

KILN-DRIED CAR SIDING & ROOFING

OUR SPECIALTY.

Send for Prices.

CAR LUMBER



YOUNGSTOWN CAR WORKS

Railroad Freight Cars, Broad and Narrow-Gauge.

MILLIKEN, BOYD & CO.,

Youngstown, Ohio.

CAR ROOFING & SIDING, Adams & Lord, 252 S. Water St., Chicago.

AND RAILWAY LUMBER OF ALL KINDS.

BERTHOLD & JENNINGS,

S. E. COR. 4TH AND CHESTNUT STS.,

ST. LOUIS.

RAILROAD LUMBER

PINE AND HARD WOODS,

OAK AND CYPRESS PILING, ETC.

Bills Sawed to Order. Large Stock Long Leaf Pine Sills Always on Hand.

SHEPARD & MORSE LUMBER CO.,

Wholesale Dealers in

Canada and Western Lumber.

CAR LUMBER.

SAW MILLS:

Buckingham, P.Q., Canada; East Saginaw, Mich.

STEAM MILLS FOR DRESSING:

Burlington, Vt.; Tonawanda, N. Y.

OFFICES:

Boston, Mass., Liberty Square, Mason Building; Burlington, Vt., 1 College Street; Tonawanda, N. Y., corner Main and Thompson Streets.

BRADLEY CAR WORKS, WORCESTER, MASS.

ESTABLISHED 1833.

MANUFACTURERS OF EVERY DESCRIPTION OF

RAILWAY CARS.

OSGOOD BRADLEY, Proprietor.

Bound Volumes of the National Car-Builder

For 1880 and 1881.

Price, - - - $3.00 each.

W. C. ALLISON,

Thirty-Second and Walnut Streets, Philadelphia,

Manufacture all kinds of Wrought and Cast Iron Work for Cars, Buildings and Bridges.

Every description of Railroad Cars, Bolts, Nuts and Washers. Also manufacture, from the best quality of Iron, Gas, Steam and Water Pipe. Iron and Steel Lap-Welded Boiler Tubes.

LOCOMOTIVE BOILER TUBES A SPECIALTY.

LITCHFIELD CAR AND MACHINE COMPANY,

LITCHFIELD, ILLINOIS,

Manufacturers of all kinds of Passenger and Freight Equipment, both Wide and Narrow Gauge.

CAR WHEELS A SPECIALTY IN THE MACHINERY DEPARTMENT.

Especial attention is given to furnishing Hoisting Engines, Pit Cars, Dumps, etc., etc., for Coal Mines, as well as building Stationary Engines and Boilers, and General Brass and Sheet-Iron Work.

PENINSULAR CAR WORKS,

DETROIT, MICH.,

Operating Peninsular Car Works, Detroit Steam Forge and Adrian Car Works.

FREIGHT CARS OF EVERY DESCRIPTION.

WHEELS AND CASTINGS, HAMMERED IRON AXLES.

WORKS AT DETROIT AND ADRIAN, MICH.

MORSE TWIST DRILL AND MACHINE COMPANY

MANUFACTURES

Patent Twist Drills, Machine Bits for Wood, Bit Stock Drills, Reamers, Standard Gauges, Milling Cutters and Special Tools, for use in Railroad, Car and Locomotive Shops. NEW BEDFORD, Mass.

J. H. MONTEATH,

Importer and Dealer in

MAHOGANY & FANCY WOODS,

Office: No. 151 Centre St., New York.

Special Inducements to Car Builders.

CAR GLASS A SPECIALTY,

"SCHANCK'S" GLASS DEPOT.—FOUNDED 1837.

THEO. W. MORRIS & COMPANY,

Importers of Plate and Sheet Glass,

27 CHAMBERS AND 3 READE STS., NEW YORK.

112 WEST 2D ST., CINN., O.

Thin Plate; Crystal Sheet, thick and flat; Embossed Work for Coaches and Sleepers; Deck Lights; Signal Colors; and all Glass required in R. R. Construction.

HOWARD IRON WORKS,

BUFFALO, N. Y.,

MANUFACTURERS OF

Schlenker's Automatic Revolving Die Bolt Cutter and Nut Tapping Machine.

SPECIALLY ADAPTED FOR RAILROAD WORK.

McIVER BROS. & CO.

SUCCESSORS OF

RICHARDSON, MERIAM & CO.,

WORCESTER, MASS.,

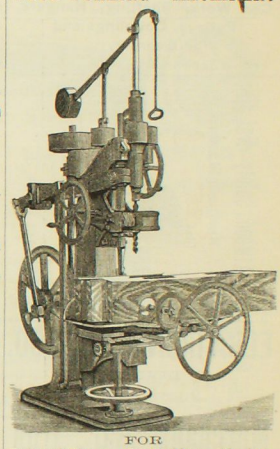
SPECIAL

WOOD-WORKING MACHINERY

FOR RAILROAD SHOPS AND CAR-BUILDERS.

SEND FOR CATALOGUE.

WOOD-WORKING MACHINERY



FOR

Railroad Shops, Car-Builders, Planing-Mills, Bridge Builders, Sash, Door and Blind Makers.

SEND FOR NEW CATALOGUE.

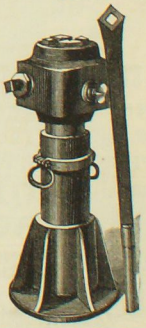
GOODELL & WATERS,

THIRTY-FIRST AND CHESTNUT STS., PHILADELPHIA, PA.

THE

"RELIANCE" HYDRAULIC JACK

SIMPLE IN CONSTRUCTION AND DURABLE,



Manufactured of Selected Material in the most thorough manner.

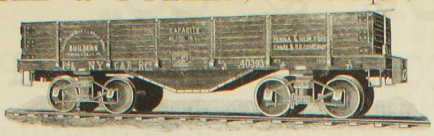
Lowering valve worked by thumb screw, giving operator perfect control in lowering. Pump plunger guided top and bottom, insuring perfect working.

PHILIP S. JUSTICE,

14 N. 5th Street - - Philadelphia.

LEHIGH CAR, WHEEL AND AXLE WORKS,

McKEE & FULLER, Catasauqua, Pa.,



MANUFACTURERS OF

BROAD AND NARROW-GAUGE FREIGHT & COAL CARS

OF EVERY DESCRIPTION.

WHEELS For Freight, Locomotive, Truck, Tender, and Passenger Service, HAMMERED AXLES and other forgings.
Capacity: 16 BOX-CARS PER DAY, 300 WHEELS PER DAY.
Wheels Fitted to Axles, and Prices Furnished on Application.

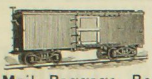
THE HARLAN & HOLLINGSWORTH CO.,

CAR BUILDERS,

WILMINGTON, DEL.

Established in - - - - - 1836.

PARDEE CAR WORKS.



WATSONTOWN, PA.,

PARDEE, SNYDER & CO., Limited,

PROPRIETORS,

MANUFACTURE

Mail, Baggage, Box, Gondola, Flat, Gravel, Ore, Coal, Mine and Hand Cars, Kelley's Patent Turn-Tables and Centres for Wooden Turn-Tables, Car Castings, Railroad Forgings, Rolling-Mill Castings, Bridge Bolts and Castings.

We have in connection with our Car Works an extensive Foundry and Machine Shop, and are prepared to do a general Machine Business.

ARIO PARDEE, Chairman. H. F. SNYDER, Treas. and Gen. Man. O. LEISER, Secretary.

New York City Office, Room A, 137 Broadway, C. W. Leavitt, Agent.

MIDDLETOWN CAR WORKS,

MICHAEL SCHALL & ARTHUR KING, Proprietors,

MANUFACTURERS OF

RAILWAY AND MINE CARS.

SPECIAL ATTENTION GIVEN TO CAR REPAIRS.

MIDDLETOWN, PA.

Pure Hard Curled Hair,

EITHER GRAY OR BLACK,

AND ALL GRADES OF MIXED HAIR.

N. O. MOSS, JAPANESE MOSS, FIBRE,

Wide and Narrow STRAINING WEB,

AND ALL

Stuffing Material for Car Seats and Backs.

MELLEN & CO. Manufacturers,

144 WORTH ST., NEW YORK.

ERIE CAR WORKS [LIMITED],

ERIE, PA.

Capacity 16 Cars Per Day.

FREIGHT CARS OF BEST MATERIAL, AND CONSTRUCTION A SPECIALTY.

H. M. CLAFLEN, President. S. SHELDON, Engineer.
J. N. ASHBURN, Secretary. W. REUSCHEL, Ass't Eng'r

CLEVELAND BRIDGE & CAR WORKS,

BUILDERS OF

BRIDGES AND ROOFS,

EITHER OF IRON OR WOOD, ALSO

FREIGHT AND STREET RAILWAY CARS,

WITH ALL DESIRABLE IMPROVEMENTS.

Manufacture Car Wheels and Castings of All Kinds.

OFFICE: 121 SUPERIOR STREET.

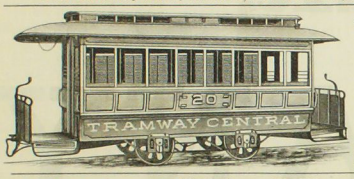
Works: Cor. Lake and Wason Sts., Cleveland, O.

CORDESMAN, EGAN & CO.,

MANUFACTURERS OF THE

Most Improved and Patented WOOD-WORKING MACHINERY,

Nos. 236 to 250 WEST FRONT STREET, CINCINNATI, O., U. S. A.

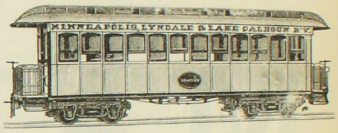


J. G. BRILL & CO.,

PHILADELPHIA,

BUILDERS OF

RAILWAY AND TRAMWAY CARS.



FREIGHT CARS OF EVERY DESCRIPTION.

J. L. GILL, JR.

ALLEGHENY CITY, PA.

SOUTHERN STATES COAL, IRON & LAND COMPANY [LIMITED],

SOUTH PITTSBURG, TENN.,

BUILDERS OF FREIGHT CARS.

MICHIGAN CAR COMPANY,

Manufacturers of

RAILROAD CARS,

OFFICE: NO. 2 MOFFAT BLOCK, DETROIT, MICH.

JAMES McMILLAN, President. H. W. DYAR, Assistant Manager.
HUGH McMILLAN, V. Pres. and Gen. Manager. W. K. ANDERSON Treasurer.
JAMES McGREGOR, General Superintendent. JOSEPH TAYLOR, Secretary.

DETROIT CAR WHEEL COMPANY,

Manufacturers of

LOCOMOTIVE AND CAR WHEELS. RAILROAD AND OTHER CASTINGS,

DETROIT, MICH.

JAMES McMILLAN, President. J. H. WHITING, Superintendent.
HUGH McMILLAN, V. Pres. and Gen. Manager. W. K. ANDERSON, Secretary and Treasurer.

BAUGH STEAM FORGE COMPANY,

Manufacturers of all Descriptions of

CAR AND DRIVING AXLES, COUPLING LINKS AND PINS, SHAFTINGS, DRAW BARS, ETC.

Works on River Road, Below City,

DETROIT, MICH.

JAMES McMILLAN, President.
HUGH McMILLAN, V. President and Treasurer. SAMUEL A. BAUGH, Superintendent.
JOHN B. BAUGH, General Manager. W. K. ANDERSON, Secretary.

DETROIT IRON FURNACE COMPANY.

LAKE SUPERIOR CHARCOAL PIG IRON,

FOR CAR-WHEEL AND MALLEABLE USE.

DETROIT, MICH.

JAMES McMILLAN, President. LEE BURT, Manager.
HUGH McMILLAN, Vice-Pres. and Treas. E. C. WETMORE Secretary.

F. W. DEVOE & CO.,

MANUFACTURERS OF

DRY COLORS, COACH AND CAR COLORS IN OIL AND JAPAN,

Special Colors Compounded to Match any Desired Shade.

FINE RAILWAY VARNISHES AND JAPANS FOR PASSENGER COACHES.

Also Freight Car, Caboose and Bridge Paints Ready for Use. Fine Brushes for Railroad Car and Coach Painting. All Kinds of Painters' Supplies and Artists' Materials.

Railroad Companies will save themselves great trouble in painting by allowing F. W. Devoe & Co. to prepare their Passenger and Freight Car Colors. This will insure DURABILITY, UNIFORMITY and ECONOMY. As we manufacture from the crude materials, which are the component parts of any shade, we understand better their chemical relationship, when in combination, than can be possible to those who simply buy their dry materials and then grind them. SEND FOR CATALOGUES AND LISTS OF SAMPLE COLORS.

F. W. DEVOE & CO.,

Cor. Fulton and William Streets, NEW YORK.

MANUFACTURERS OF RAILWAY CAR VARNISHES.

JOHN BABCOCK & Co

NO. 2 LIBERTY SQUARE BOSTON, MASS.

ESTABLISHED 1845.

MOSES BIGELOW & CO.,

NEWARK, N. J.

RAILWAY VARNISHES

PARKER

CEMENT PAINT.

SPECIALLY ADAPTED FOR

FREICHT CARS, BRIDGES, ETC.

3,000 TO 5,000 BBLS. SOLD YEARLY.

MANUFACTURED ONLY BY

CARY, OGDEN & PARKER,

SPECIAL MANUFACTURERS OF

FINE COACH COLORS, TRUCK AND ROOF SHADES, WHITE LEAD, PAINTS, ETC.

235 LAKE STREET, - - - - CHICAGO.

J. RAYNER,

IMPORTER AND DEALER IN

MAHOGANY

AND ALL FOREIGN AND DOMESTIC

CABINET WOODS.

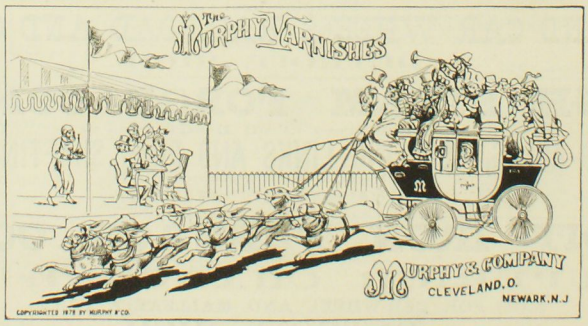
SPECIAL INDUCEMENTS TO

CAR BUILDERS.

Mills, Yards and Wharf:

Foot Houston Street, E. R., New York.

THE MURPHY VARNISHES ARE THE ACKNOWLEDGED STANDARD FOR Railway Work THROUGHOUT THE UNITED STATES.



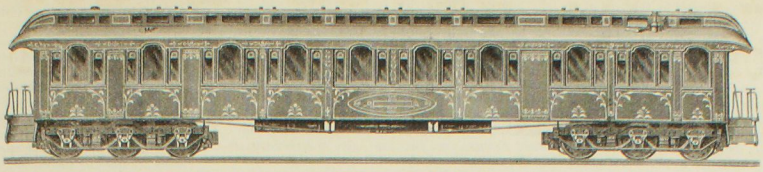
THE A B C SYSTEM OF RAILWAY PAINTING HAS THE INDORSEMENT OF LEADING RAILROADS AND CAR-BUILDERS.

231 Broadway, NEW YORK.

MURPHY & COMPANY.

Canal and Harrison Sts CLEVELAND, O.

THE NATIONAL CAR-BUILDER.



DEVOTED TO THE INTERESTS OF RAILWAY ROLLING STOCK.

VOLUME XIII. NUMBER 3. MARCH, 1882. SINGLE NUMBERS, TEN CENTS. $1.00 PER ANNUM.

Miscellaneous Items.

MR. AUGUSTUS SCHELL has been chosen President of the Wagner Sleeping Car Co. in place of Webster Wagner, deceased.

THE Delaware & Hudson Canal Co. constructed last month 100 gondola coal cars at their Green Island shops, near Troy, N. Y.

THE Troy & Boston road is testing the Graydon safety heating apparatus on a passenger train running between Troy and North Adams.

THE Boston & Maine Company has decided hereafter to use Baker heaters in its passenger cars, and to inclose the heaters in a room or casing of boiler iron.

THE Schenectady Locomotive Works, at Schenectady, N. Y., recently delivered two passenger engines to the Virginia Midland road and are building several more for the same road.

MR. JOHN S. SILVER has been elected Secretary of the National Car Spring Company, of New York. He has been connected with the company in other capacities for the past twelve years.

THE Valley Machine Co., Easthampton, Mass., is supplying the St. Paul, Minnesota & Manitoba, and Canadian Pacific railroads, with steam pumps and boilers used at pumping stations.

IT has been decided to remove the Chicago & Grand Trunk repair shops from Port Huron to Battle Creek, Mich., that town giving a bonus of $25,000 and 25 acres of land to secure the location there.

THE North Carolina Car Company has been organized at Raleigh, N. C. The works will be on the line of the Raleigh & Gaston Railroad, and will build freight cars and give employment to about 75 men.

A FLAT car of the Michigan Central road, built by the Michigan Car Co., on its first return trip from New York, carried a through load of Southern pine weighing 25 tons without any apparent injury to the car.

THE New York Central & Hudson River Company has ordered that a flagman or third brakeman be added to the crew of each freight train, in order that a signal may be sent out or left behind without crippling the train force.

ASBESTOS paint applied to wood, canvas, or other combustible materials, is said to be an effective protection against fire, the painted surfaces resisting ignition even when exposed for a considerable time to the fiercest flame.

THE Committee on Railroads of the Connecticut Legislature is considering a bill requiring railroad companies to carry axes, crowbars and fire-extinguishers in their passenger cars; also to require the use of steam heaters instead of stoves.

MR. CHARLES E. BARRETT, who has represented the Missouri Car & Foundry Co., of St. Louis, and the Indiana Car Co., of Cambridge, Ind., the general agent in Chicago, has resigned to accept the vice-presidency of the Jacksonville Car Co.

SINCE the 1st of August, 1881, the *Travelers' Official Guide* has added to its Index of Railway Stations the names of nearly 2,000 new stations. No better evidence than this can be found of the enormous growth of railroads in this country.

THE *Railroad Gazette* reports 137 train accidents during the month of January, by which 41 persons were killed and 198 injured; 25 of the killed and 67 of the injured were railroad employés, and 16 of the killed and 131 of the injured were passengers.

A CAR shed of the C. B. &. Q. road at Aurora, Ill., was destroyed by fire Jan. 24, burning up a directors' car, a dining car, six other passenger cars and several caboose and freight cars. A large pile of seasoned black walnut lumber was also destroyed. The loss is estimated at $65,000.

MISS BELLE BRADEN, who has recently been re-elected Treasurer of the Waynesburg & Washington Railroad, in Pennsylvania, for a second term, is probably the only lady in the United States who is a railroad officer. She is also Paymaster, and makes regular trips over the road in the pay car.

THE McQueen Locomotive Works, of Schenectady, N. Y., have filed articles of incorporation, with a capital stock of $300,000. The works are to be located near the crossings of the New York Central and Delaware & Hudson Canal Co.'s tracks. Mr. Walter McQueen is to be the general manager.

THE National Car Company, of St. Albans, Vt., has voted to issue $1,000,000 new stock and $800,000 six per cent. bonds, the proceeds to be used in building 2,000 new 34-foot 20-ton cars. The company proposes to erect extensive new car works at some other point in Vermont than St. Albans, the taxes in that place being too heavy.

WORK is being pushed on the main line of the Hoosac Tunnel & Western, between Saratoga Lake and Mechanicville, N. Y., so that next summer Boston passengers by the Fitchburg road, and New Haven and Hartford passengers by the N. York, N. Haven & Hartford, and N. Haven & Northampton roads, will reach Saratoga Springs an hour and a half ahead of those by any other lines.

THE Tredegar Company, Richmond, Va., employ 1,500 men in their rolling mill, foundry, machine and car shops; over 300 of them are in the car shops. The capacity of these works is 8 freight cars, 100 car wheels and 100 axles a day, besides a great number of castings and forgings for every kind of railway work. They make 800 kegs of spikes a day, and a large amount of bar iron of various kinds.

THE London & Northwestern Railway Company has purchased the right to use chemical stoves in its cars—stoves or cylinders filled with hyposulphite and acetate of soda, heated at the central station by being immersed in boiling water and then put in the cars, where they give forth the heat equably and for a long period of time—ten or twelve hours.

THE American Brake Company have shipped four sets of locomotive brakes to the Baldwin Locomotive Works for use on engines for the Cincinnati, New Orleans & Texas Pacific Railroad and four sets to the Rogers Works, Paterson, N. J., for engines building for the St. Louis & San Francisco road. This company are also equipping a number of freight cars of the St, Louis & San Francisco road with automatic brakes.

MR. JOHN COOKE, President of the Danforth Locomotive Works, at Paterson, N. J., died at his residence in that city, Feb. 20, aged 58. He was born in Montreal, and has lived 43 years in Paterson. There was nothing particularly brilliant in his career, but his work was of a kind which produced uniformly good results, and this was due to his untiring industry and an ambition to excel in the sphere of life he had selected.

THE Long Island Railroad Co. reports that during the year ending Sept. 30, 1881, 100 new freight cars were added to its equipment, and that 10 new parlor coaches were placed on the road by the Woodruff Company. Six new passenger engines of the largest size have been contracted for, also 20 passenger coaches of the Pennsylvania Eastlake pattern. The company has also purchased 10,000 tons of steel rails to be rapidly placed in the track.

THE Catasauqua (Pa.) car works of McKee & Fuller are building for the New York Live Stock Express Co. ten 40-foot cattle cars, Tallman's patent. They have a capacity for 16 cattle, each animal having space sufficient to lie down, with flexible partitions between, and can at the same time be fed and watered. The cars have New York Central iron trucks, Hopkins lead-lined bearings, continuous drawbars and Hewitt box covers.

THE Maine Central Railroad Co. has been considering for some time the question of building new shops, the old ones at Waterville being insufficient for the work to be done. It is now stated that the company has accepted a proposition made by the city of Portland to sell a tract of land as a site for the shops at a nominal price. It is understood that the principal shops will be established in Portland, though the Waterville shops will probably be kept up also.

ONE of the heaviest and most powerful locomotives in the country is now being constructed for the Southern Pacific Railroad at the shops in Sacramento. When in running order it will weigh 60 tons, and the tender, with coal and water on board, thirty more. It is designed to draw twelve loaded cars over the heavy grade of Tehatchepi Pass, and will run only between Caliente and Mojave, a distance of 45 miles.

THE following figures show the growth of the street tramway traffic in Great Britain from June 30, 1878, to June 30, 1881:

	1878.	1881.	Increase.
Miles operated	158	483	325
Locomotives	14	40	26
Horses	9,922	15,220	5,098
Cars	1,124	2,045	921
Passengers	146,001,223	205,623,500	59,622,277
Gross receipts	£1,145,465	£1,576,301	£430,836
Working expenses	£868,315	£1,239,896	£371,581
Net earnings	£277,160	£336,415	£59,255

THE Tanner & Delaney Engine Co., of Richmond, Va., built 150 engines last year before the partial destruction of their works by fire in November. The works have been repaired, and 12 acres of land purchased in the northern part of the city on the line of the Chesapeake & Ohio road, for the erection of more extensive works, with facilities for building locomotives as well as portable and stationary engines, as heretofore. The new shops are expected to be ready to begin work before next fall.

THE cars on the Italian railroads from Venice to Susa, at the foot of Mont Cenis, are of the American pattern, without compartments. They are without stoves, but are nicely warmed by portable flattened metallic cylinders about three feet in length, filled with hot water, and as they gradually cool, they are changed for those which are warmer, at the several stopping places. The warm water in these cylinders is secured from leakage, by screw orifices, and is of a temperature adapted to the warming but not burning the feet put upon them.

RAILWAYS in the Southern States show a remarkably low capitalization, as compared with those in other parts. The cost and equipment of the 13,548 miles of railway in those States, Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Tennessee and Kentucky, stand at an average of $34,500 per mile, or $468,940,551 in all. The 15,881 miles of railway operated in the Middle States—New York, New Jersey, Pennsylvania, Delaware, Maryland and West Virginia—stand at a cost of $83,500 per mile, or $1,242,155,044 in all.

WHENEVER a crack locomotive gets within a dozen or twenty miles of Bound Brook, New Jersey, it becomes restive under restraint and eager to dash off and show its best paces. The latest score is 72 miles an hour for a short distance, with an incumbrance of five cars. It was a Baldwin engine, 18 × 24 cylinders, on the Central R. R. Another report says that engine "224" made 28½ miles in 25½ minutes, between Yardley and Bound Brook, and one mile was run in 42 seconds, or at the rate of 84 miles an hour! After this, who will taunt New Jersey with being *slow?*

THE Richmond & Alleghany road is building a new round-house of 14 stalls at Richmond. It has just received from the Grant Locomotive Works a 4-wheeled switching engine with 50-inch drivers and weighing 42 tons. These works are building 26 locomotives of different patterns for the road, to be delivered the coming summer, there being a standard pattern for each class. The 8-wheeled engines have 18 x 24 cylinders, 48-inch boilers, 5 ft. drivers, and weigh 32 tons. The road is also having 164 box, 27 flat, and 25 stock cars built at the Tredegar Works.

THE Columbia Car Spring Company, of New York, has been consolidated with the Globe Iron Works, and the business of both establishments will hereafter be conducted under the name of the Globe Iron & Columbia Car Spring Works, at 545 West Thirty-third street, New York. The new arrangement affords increased facilities for the manufacture of car springs of every description, in connection with that of car wheels, axles, railway castings, switches, turn-tables, etc. Messrs. Andrews & Clooney, heretofore the officers of the Columbia Car Spring Co., are the proprietors of the new company.

THE Baltimore & Potomac R. R. has tested the "Extended Smoke-box," illustrated in the CAR-BUILDER of May, 1880, by continuous use since that time, and has adopted it as a standard. It is applied to all their passenger en-

gines which burn soft coal and have brick arches in the fire-boxes. The engineers like this combination, and consider the engines better steamers with them than without. The extended front end will be applied to the freight engines as fast as they go into the shops for repairs. The more recent ones put on have an improvement for discharging the sparks at the end of the run, in which they use steam from the boiler.

THE New York & New England road is building six locomotives; two moguls at the Norwood shops; two moguls at the Hartford shops, and two switching engines at the Norwich shops. The moguls will have 18x24-in. cylinders, 50-in. wheels, 52-in. boilers, and 72-in. fire-boxes. In working order they will weigh about 85,000 pounds. The switching engines will be six-wheeled connected, with 16x22-in. cylinders. Mr. Boyden, the Superintendent of Motive Power, prefers the moguls, which run at slower speed and do switching at stations; but for through freight trains, which run faster, he prefers the consolidation engines. These engines also consume less fuel per car mile.

THE Middletown Car Works, at Middletown, Dauphin county, Pa., Messrs. Schall & King, proprietors, consist of eight substantial brick structures that are perfectly fire proof. They are thoroughly equipped with the best machinery and appliances for turning out work with the utmost dispatch, and have not been idle a day, except for repairs, since they were put in operation by the present proprietors in 1879. About 175 men are employed, and from four to six 8-wheel freight cars are turned out daily. Over 700 narrow-gauge cars have recently been completed for various roads, and the works are now engaged in filling a large contract with the Inter-colonial Railway, of Canada.

THE following table shows the average miles of railway to each square mile in the State and countries named:

	Area in sq. miles.	Miles of railroad.	1 mile to sq. mile.
Massachusetts	7,800	1,803	4.12
Belgium	11,373	2,672	4.26
England and Wales	58,320	12,547	4.64
New Jersey	8,320	1,701	4.89
Connecticut	4,750	954	4.98
Rhode Island	1,306	210	6.21
Ohio	39,964	5,912	6.75
Illinois	55,414	7,955	6.96
Pennsylvania	46,000	6,243	7.36
Delaware	2,120	280	7.57
Indiana	33,809	4,454	7.59
New Hampshire	9,280	1,015	9.14
Switzerland	15,253	1,598	9.53
New York	47,000	6,019	9.80

THE stockholders of the Pullman Palace Car Company met last week and voted to increase the capital stock of the company one-fourth, or $2,52o,600. The proceeds of the sale of the new stock is required to provide for the manufacture of the large number of additional cars required by the company under new contracts and to supply the necessities of increased travel on lines where the Pullman cars are now used. Contracts have recently been made with the Northern Pacific and Chesapeake & Ohio for the complete equipment of those roads with sleeping cars, and it is understood that new sleepers are to be put on the Union Pacific. The construction of 115 new sleeping cars of the most elegant and approved pattern is to be at once ordered and they will be finished as soon as possible.—*Railway Register.*

THE Richmond & Danville road is building at its own shops 2 baggage, 2 combination and 1 pay car. The latter is 45 ft. long over sills, and 9 ft. 8 in. wide. At one end is a kitchen the full width of the car, and 8 ft. long; next is a bedroom, 10 x 7 ft., with two berths and a lavatory, and next the paymaster's office, 7 x 9 ft., with table, desk and two safes. At the other end is a lobby 13 x 9 ft., in which will be placed a Spear heater. There is a passage way on one side between lobby and kitchen. In the car side is a 30-in. door opening into the office. The safes are put in through it. Under the car are lockers for ice and other stores. The road is having 300 box cars built at the Wason Works in Chattanooga, 100 by the Georgia Car Co., at Centerville, and has just received 200 from the Pardee Car Works, Watsontown, Pa.

A STREET car has been invented by a Mr. Prosser, of Chicago, which carries its track along with it, so to speak. This, however, is not its only peculiarity. It is to carry 50 people, and the more it carries the easier it runs. It is mounted on a truck with four wheels, each wheel being about 12 inches in diameter. These wheels run around the the inside of steel tires ten feet in diameter; the tires rest on the ground and are held to the car by a set of wheel clamps. It is said that two horses are required to pull the car, presumably with a load of 50 passengers; but if the load is doubled, a mule is sufficient. The car running light, would, on the contrary, require four horses. This is the way the thing works, as we understand it. The invention is probably a new metamorphosis of the "twin-cylinder" project, which came near revolutionizing the grain carrying traffic a few years ago.

A SERIES of fifty new passenger cars are being put on the Erie Railway. Ten are already in daily use, and the others will be added as rapidly as possible. The coaches are finished inside with natural woods, and are exceedingly rich and elegant. The upholstery is luxurious, and the backs of the broad seats are high, handsome and comfortable. The racks and hooks are arranged with an idea to accommodating the passengers, and they do so. The capacity of each car is sixty-four passengers. The heating by steam and the ventilation by a patent arrangement do this important work systematically and well. The decoration on the interior of the arched roof is very fine, and the exterior is handsomely painted in a rich dark color. A part of the cars are being made by the Jackson & Sharp Company, of Wilmington, Del., and the others by the Pullman Palace Car Company, of Chicago.—*Elevated Railway Journal.*

THE New York, Lake Erie & Western report for the year ending Sept. 30, 1881, says that the passenger car stock has been nearly all reduced to standard gauge. The other changes in the year are a reduction of 10 in the number of first-class cars, and an increase of 4 in the number of second-class and emigrant, and of 5 in the number of baggage, mail and express cars. In freight cars the number of 6-ft. gauge has been reduced by 3,960, and the number of standard gauge increased by 6,068—a net increase of 2,108. The increase is chiefly in gondola dump cars, of which 2,642 have been added. There is an increase of 353 in box and of 65 in stock cars, but a decrease in other kinds and a large one in 4-wheel coal cars. Gondola dumps are apparently taking the place of coal cars. A very large proportion of the stock of freight cars and 45 of the locomotives are leased of car trusts on a contract to purchase, paying in installments.

THE car and locomotive shops of the Virginia Midland Railway, at Alexandria, Va., employ 180 men. Last year, besides the current repairs of 41 locomotives and over 600 cars, they built one 8-wheeled passenger, one 10-wheeled freight, and commenced another 10-wheeled freight locomotive, which is now in the shops; 150 freight cars, 2 coaches, 2 combination and 2 reclining chair cars, with 60-ft. bodies, and also 4 cabooses. The latter have a passenger room, with 16 seats at one end, a conductor's room with a clear-story in the center, and a sleeping room with 6 single berths at the other end. Their wrought-iron couplings have three slots for the links and a long coupling-pin that permits them to couple to the cars recently built which have draw-bars of the standard height, to the old cars whose draw-bars are much higher, or to a car with an extra low draw-bar. This road uses a cast-iron buffer on its freight cars, which was designed by Mr. Nalls. It has a large opening through which the coupling-pin can be taken out or put in in coupling or uncoupling without danger of catching the hand between the buffers or the body between the cars. They are placed over the draw-bars, and relieve them from all compressive strains after the draw-bar springs have been compressed about an inch.

THE Chesapeake & Ohio road's shops, at Richmond, Va., employ about 200 men, and are kept very busy with current repairs. A lot of 30 stock cars, which they have just built at the rate of two a week, is the only new work they have been able to do for some time. This road is receiving 15 freight cars of different kinds per week from the Tredegar Co., which is now building 100 stock cars for their E. L. & B. S. extension. It is having 1,000 box cars built by the Ensign Manufacturing Co., at Huntington, W. Va. It has just received the last of a lot of 18 cars built by the Gilbert & Bush Co., consisting of 7 first-class and 5 second-class passenger, three baggage and mail, and three baggage and smoking cars. The first-class passenger cars have an inside finish of curl maple panels and black walnut moldings, and decorated canvas head-linings. They are lighted by four lamps and heated by two Spear stoves. The ice cooler is on a stand outside of the closet. The cars seat 54 passengers. The seats are all upholstered in red and green plush, and have the Buntin seat ends. The doors and door frames and the window sash are of bay wood. The second-class cars are the same, except that they have perforated wooden seats. This road, after trying the Pullman color for three years, has again adopted orange as the standard color of their passenger train cars, because they find it to be the most durable and economical.

THE Massachusetts Railroad Commissioners have issued a circular to the presidents and directors of the railroads of that State, calling their attention to the existing laws of the commonwealth providing for the punishment of railroad employés who are guilty of negligence in the performance of their duties, and especially to the following enactments:

When an engineman, fireman or other agent of a railroad corporation is guilty of negligence or carelessness whereby an injury is done to a person or corporation, he shall be punished by imprisonment not exceeding 12 months, or by a fine not exceeding $1,000.

Whoever, having the management of or control over a railroad train while being used for the common carriage of persons, is guilty of gross carelessness or neglect in or in relation to the management or control thereof, shall forfeit a sum not exceeding $5,000, or be imprisoned not more than three years.

The Commissioners hold that the guilt of the delinquent does not depend in any degree upon the result of an accident that may be caused by his fault, the chief end of punishment being to protect the community against such negligence; and that it may therefore be the duty of railroad managers to prosecute the guilty parties, whether loss of life may have resulted from their negligence or not. Although it may be hard in such cases to secure convictions, or even to procure indictments, the responsibility of managers is all the same. When lives have been lost by a preventable accident, public opinion demands a trial; but public safety also demands it whenever lives have been endangered by such accident.

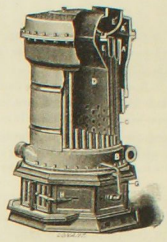
Salmon's Hot Water Heater for Railway Cars.

The device represented in the cut has been very successfully applied to horse cars, and seems to be equally well adapted to steam cars as respects efficiency, safety and economy.

A B are water chambers connected by the heating tubes *C*, which surround the perforated boiler iron fire-pot *D*. *E* is a smoke chamber surrounding the fire-pot, and E^1 the smoke flue. *F* is the radiating pipe connected with the overflow chamber, and A^1 is the steam chamber.

The operation of the heater is as follows: The heat passes out through the perforations in the fire-pot *D* into the space between it and the outside jacket, this space being occupied by the heating tube *C*. It then passes on between and around the tubes, and through the smoke chamber *E* to the smoke flue E^1, thereby heating the water contained in the heating tubes and causing it to rise and overflow the upper ends of the tubes in the overflow chamber *A*, while the steam rises into the steam chamber A^1, and the water flows off through the radiating pipes *F* around the car and returns to the lower water chamber *B* to be reheated.

The draft regulator is placed inside of the base, and is connected with the lower water chamber *B* by the pipe *G*, through which the pressure of steam is communicated to the diaphragm operating the lever *H*, which regulates the draft.



The construction of this heater is such as to secure a very rapid circulation, with coal in a sufficiently *low state of combustion* to produce the greatest amount of heat from a given amount of fuel, which is of itself a safeguard in case of accident. It is a base-burner, and consequently a self-feeder, the column of coal contained in the fire-pot burning only about half way up from the grate.

The fire-pot is a boiler-iron cylinder extending to the top, with no opening excepting at the top and bottom, both of which are so securely locked as to preclude the escape of fire, even though the heater should be tumbled end over end, unless it is broken into, in which case the iron jacket and water tubes, which completely surround the fire-pot, must be broken through before the fire-pot can be injured, and the escaping water from the broken tubes and water chambers would extinguish the fire.

The heater is smaller than any other in use, and has in its base an automatic draft regulator, which can be set to control the heat at any degree desired. The coals do not come in contact with the water tubes, consequently the hardest coal can be used, which is not the case with those in which the water tubes occupy the interior of the fire-pot; this is also an advantage, as the fire will last much longer than soft coal, much of which in heaters now in use is wasted, being chilled by contact with the water tubes. The heater is about to be tried on the passenger cars of the Boston & Albany road. The inventor and manufacturer, Mr. I. A. Salmon, may be addressed at 149 "A" Tremont street, Boston.

A Courageous Engineer.

Heroes are not always the product of war. There are deeds of daring outside of the record of battle-fields that for self-forgetfulness and deliberate courage should range the actor alongside the captains of history. Now and then, in quiet times of peace, emergencies spring up which demand the highest order of heroism. They call upon men to expose themselves to almost certain death that others may be saved. One of these emergencies occurred recently at Waynesboro, Pa. Trains Nos. 22 and 14 and 12 and 16, on the Chesapeake & Ohio road, going east, had orders to meet and pass four sections of extra trains coming west at Blue Ridge. The extras were late, and, as a consequence, eleven trains were blocked on the main track above Waynesboro awaiting their arrival. After three of the extra trains had passed, the first section of No. 14 started out and commenced ascending the heavy grade to the tunnel. Rain and sleet were falling, and the engine of No. 14 being unable to draw its cars, and the engineer of the train immediately following it, Mr. R. P. Irving, detached his engine from his own train, and coupling on to the rear car of No. 14, aided the ascent. After pushing the first train nearly a half a mile and giving it a good start, Mr. Irving reversed his engine and started to return to his own train, but ere he had reached it he saw a detachment of the train he had left coming down the mountain at a rapid rate, it having become uncoupled from the engine. In an instant the intrepid

engineer realized the peril of the situation. Thirteen heavily-loaded cars were coming down a seventy-five foot grade, and each revolution of the wheels was adding velocity to its speed. With rare presence of mind and an iron nerve that few men possess, Irving started his engine to meet the descending mass and break the force of the collision. He ran up to within a short distance of the cars, and then reversing to lighten the shock, clutched the lever in his firm grasp, and bracing every nerve in his body awaited the catastrophe. A moment later and the crash came. The shock of an avalanche could scarcely have been greater. One of the cars climbed up on the boiler of the engine and another was wrecked. But the brave man had accomplished his purpose. The wild train was stopped and the engineer had saved many a precious life and thousands of dollars' worth of property. He entered the very jaws of death in the discharge of his duty. But for his daring interposition the wreck would have been terrible.—*Valley Virginian.*

A Novel Railway.

In order to reach the top of a certain plateau in Switzerland a novel railway is in use. Its rolling stock consists of two cars which are run up and down the incline road by a peculiar water power. Each car has a large water tank. The tank in car No. 1, at the upper end of the road, is filled with water, whose added weight gives the car the power as it runs down the track by gravity, to pull car No. 2 from the lower end of the track to the upper, by means of a steel wire cable which is attached to each car and passes around a drum at the upper end of the road. When car No. 1, reaches the lower end of the road its tank is emptied and the tank of No. 2 now at the top is filled with water, when it in turn pulls car No. 1 to the top. A single track is used, with self-acting switches at the middle of the road, arranged so that the car going up takes one switch while the one going down takes the other, and after the cars have met and passed each car takes the single track again.

Car-Builders' Monthly Meeting—Freight Train Brakes and Brake Shoes.

The February meeting was held at the Association Rooms on the evening of the 16th ult., the subject for discussion being Freight Train Brakes, the Necessity of Brakes on all the Wheels of Freight Cars, and the Economy of a Uniform Brake-Head and Shoe. The following letters were read:

LETTER FROM JOHN KIRBY.

C. A. Smith, Esq., Sec'y:

DEAR SIR: There is no doubt but a freight train brake is a very desirable thing, were it possible to have one; but from observation I really believe that railroad managers don't care anything about such a brake, and if one railroad company should adopt one pattern, their neighbors would use some other pattern, thus adding to the already too great diversity of patterns. If railroad managers would interest themselves enough to inquire what it costs to maintain such a variety, that would be the beginning of the end. However desirable a thing a train brake for freight trains may be, some roads would have such a variety of patterns that, should the brake get out of order, no place short of the home shop could repair it. As an illustration of the proneness of men not to have anything like their neighbors, two journal-bearing patterns had to be made recently at one of our shops: these were both for what a casual observer would call M. C. B. boxes; the journals were M. C. B's., but the patterns had to be made one 4 in. wide, the other $4\frac{1}{4}$ in., the M. C. B. standard being $4\frac{1}{2}$ in. These two patterns increased the number for journal-bearings to 47, and with this large number of patterns it is not infrequent that a journal-bearing is used that is not just a fit but is the nearest that we have.

The economy resulting from the use of brakes to each wheel under freight cars, is a subject that has been much neglected by railroad men. No railroad company would think of running passenger train cars with brakes only to four wheels. That is a thing of the past. Now let us consider the gain by applying brakes to eight wheels. It will save the wheels, they not being as likely to slide when brakes are applied to all of them instead of four wheels only. With our present system of brakes, no one will claim an equal pressure on all four wheels; the brake-beam carrying the lever will apply one-quarter or one-third (according to the leverage) more pressure than the other beam, hence the sliding of one pair of wheels. 2. By applying the brakes to eight wheels under a car, it diminishes the liability to sliding, and increases the retarding power double; or, in other words, two men at the brakes when all the wheels are being operated on are as good as four where only four wheels under each car are checked. In one case eight wheels, carrying a load of 20 tons, are operated upon and at the same time; in the other case it is four wheels under two cars, each four wheels carrying 10 tons, and operated upon with an interval of time between the operations. A uniform brake-head and shoes for all freight cars I would be pleased to see, but when one railroad company have three different patterns, and not one of the three interchangeable, the hangings even of one kind are not suitable for either of the other two, when they could have been all of one pattern.

JOHN KIRBY,
Lake Shore & Mich. So. R'y.

LETTER FROM W. B. SNOW.

C. A. Smith, Esq., Sec'y:

DEAR SIR: I am in favor of train brakes that would place the perfect control of the train with the engineer, and it appears to me, that if some inventors could bring out such a brake, it would not be long before a majority of the roads would adopt it; but it must not be too expensive, nor too complicated; the cost ought not to exceed, say, $15 per car, including royalty. I have seen but little of the operation of train brakes, consequently cannot say much about them except from models in two cases. I went to Iowa last month to witness the operation of Chapman's train brake, which was operated by the compression of the draw-bars. It was a very complicated affair; the brakes were applied by the weight of the car body; when the draw-bars were at rest the brakes were set the tightest. The patentee appears to be aiming to have the brakes applied automatically when cars are set out on side track, as well as when the cars are in motion. This device is too complicated to describe intelligently without drawings. I could see no merit in it, either in principle or construction. I went to St. Louis a couple of years ago to witness a trial of the Card brake. They had a train of 14 cars, eight of them with a brake on each end. This brake worked admirably and made good stops, and ran through the sags all right. But it was not shown under all circumstances. A train had to attain a speed of 5 miles per hour to work the governor on the axle. This would preclude switching the cars more than 5 miles per hour in freight yards. This train and its brakes were fitted up to show how well it would work. All were well pleased with its operation. But I do not think it would remain in such good condition very long without readjusting.

I think one of the principal difficulties with any train brake operated by compression of the draw-bar, would be the almost endless care and attention it would require to keep them properly adjusted so as to do good braking. The motion of the draw-springs is so little that it would be lost if the parts were not frequently adjusted; at the same time, using the momentum of the train as the power to apply the brakes and stop the train, appears to be the right principal to work upon, and I confidently expect to see one produced at an early day that will work satisfactorily enough to warrant a thorough trial.

I would be in favor of putting brakes on both ends of cars in case train brakes are used, and on one end where hand brakes are used, unless the cars were to run on roads with heavy grades; then I would put brakes on both ends and connect them.

W. B. SNOW, M. M.
Ill. Cent. R. R.

LETTER FROM THO. AYLESBURY.

C. A. Smith, Esq., Sec'y:

DEAR SIR: I have come to the conclusion that it will be some time before an automatic freight train brake will come into general or partial use. The brake has yet to be invented, or at least the ones already invented have to be perfected before any of them will come into use. Now, in view of this fact, why would it not be possible for the Westinghouse or the Eames Vacuum Brake Companies to so arrange their brakes that they could be used on freight cars without the expense attending the first cost of putting it in passenger cars?

I would have the brake-beams hung as they are now, with ample clearance between the wheels and brake-shoes. Not to have any springs, let the weight of beams and shoes act as a release. Make the air cylinder longer and smaller diameter, so that there would be more travel to the piston rod in taking up slack of brakes. The cylinder should have release valves instead of release springs. But now I come to the worst part of the business, and that is the couplings. These should be made so that in switching it would not be necessary to uncouple them. That is, that in setting out cars by trainmen or switchmen the pin would be pulled as it is now, no attention to be paid to the close coupling, it should pull apart of itself without damage, at the same time it should be so constructed that there would be no possibility of uncoupling while in the train.

Now, this seems to me to be practicable, and I do not see why we should make so much ado about a freight-train brake when we have one ready at our hand, if the parties owning the brakes would make it an object for us to adopt them. If I were to use the Westinghouse, I would use the air brake in preference to the automatic, as being cheaper and more simple to handle. There would be this advantage in the automatic, that in case of the train breaking apart, the brakes would be applied to both rear and front ends of the train. As to brakes on both trucks worked by hand, I think it might be of service where there are long steep grades, and where it was necessary to release the brakes on account of the shoes heating, which is the case on one of our western roads; but for level roads and easy grades I see no necessity nor economy for double brakes. As to a uniform brake head and shoe, we are at times considerably troubled when we want to put on the proper head or shoe that belongs to a car of a foreign road, and have not got it. But I think it is one of the easiest things to overcome in making a change (if each road will agree to change) that we could take hold of. A brake head, or a solid shoe without head, can be made to take any shaped brake hanger by simply having a hole in the top part of brake head or shoe (as the case may be) to take a hook hanger, and a slot lower down to take a loop hanger. Nothing seems easier to do than to make this change without increased cost to the companies, providing the form of brake head or shoe can be agreed upon.

THOS. AYLESBURY, M. C. B.,
Kan. City, St. Jo. & C. Bluffs R. R.

LETTER FROM JOHN ORTTON.

C. A. Smith, Esq., Sec'y:

DEAR SIR: Replying to your letter of 6th, I am in favor of using brakes on all wheels under freight cars, instead of the usual one truck system, for the reason that the braking power being doubled, it will be more efficient in the stopping of trains, while it will add little, if any, extra expense, except in the first cost for equipment. It is well understood, I think, that the present single truck brake system is very deficient in its effectiveness for stopping trains, and it cannot be otherwise when we consider that only half the revolving system is operated on, the other half being left to itself to run on as long as there is any energy to keep it going.

Another reason for doubling the brakes is, that two or three brakemen can operate only on a small number of cars usually in any ordinary length of train, and therefore, in every case where they would apply double brakes, they would nearly double the retarding influence, which might under peculiar circumstances be of the utmost consequence in averting danger.

As regards the economy of having a uniform brake head, whether with or without a shoe, there cannot be two opinions on the subject; but then the question arises, "whose brake head is the best?" On that question there exists a diversity of opinion, and like all other suggestions involving a uniformity of action, there is not much likelihood of securing a universal decision and I fear the same will occur down to the end of time, or while we build cars after the present fashion.

JOHN ORTTON,
Canada Southern Railway.

Mr. Laraway exhibited a model and explained the operation of his automatic brake.

Mr. Tallman also made some remarks in reference to the brake which bears his name, and wanted to know how air brakes were to be used upon mixed trains, as suggested in the letter of Mr. Aylesbury.

BRAKE SHOES.

Mr. W. W. Snow urged the economy of applying brakes to all the wheels of freight cars. The number of flat wheels removed from freight cars using four shoes was much greater in proportion to the number in service than those removed from passenger cars using eight shoes. The necessity of having brakes upon all the wheels of freight cars was very apparent in the running of long trains, and especially if the trains had 20-ton cars. Freight trains were moved at a higher speed than formerly, and followed one another at smaller intervals of time and space. The brake appliances should therefore be more effective.

The economy of having uniform brake heads and shoes was a matter of dollars and cents, and could best be illustrated by statistics. There were in the United States and Canada not less than 300 patterns of brake shoes, and every road had to keep a stock of shoes on hand to meet the requirements of the cars they were obliged to handle. There were in service prior to Jan. 1, 1881, 18,982 locomotives, 20,253 passenger, baggage and combined cars, and 593,412 freight cars. The estimated number built and contracted for during the year 1881 was 1,500 locomotives, 1,500 passenger train cars, and 45,000 freight cars. Many of these cars had eight shoes; but allowing only four shoes for each engine and freight car, and eight shoes for each passenger train car, there was a total of 2,585,580 shoes in service. The average weight of each shoe, including those with a combined head, would not be less than 24 pounds, which gives a grand total of 62,053,920 pounds, and this at 2 cents a pound would be $1,241,078.40. Some roads claim that they carry only 5 per cent. of their brake shoes on hand for all renewals, but admit they could get along with one per cent. if the patterns were uniform. Assuming this to be true, there would be a saving of four per cent. of the sum named, or $49,643.13, by having a uniform standard pattern. The most difficult question to determine was the kind of pattern to be adopted. The essential things to be secured were cheapness, strength, durability, easy replacing and minimum weight of metal.

Mr. Snow then called attention to a shoe which was an improvement on the Christie shoe, and which was already extensively used. The improvement was not patented, and the Christie patent had but a few months more to run. The improved device was easily applied, and did not interfere with the old heads now in use. The weight of the combined head and shoe ranged from 32 to 40 pounds. In regard to parts requiring most frequent renewal he would recommend cast and wrought iron combined. Such a shoe always adhered to the wheel with the same tenacity in winter or summer, wet or dry, and was extremely durable, outlasting four cast-iron shoes. He then submitted the following statement of the saving which would result from one equipment of the Congdon shoe, applied to the entire railway rolling stock of the United States and Canada:

Total number of shoes in service	2,585,580
Total weight at 24 lbs. each	62,053,920
Cost at 2 cents per lb	$1,241,078.40
Cost of 4 sets common shoes	$4,904,312.60
Less 3 sets old iron at ¼ original weight, at 1c. per lb	130,134.55
Net cost 4 sets common shoes	$4,834,178.05
Cost 1 set Congdon at 4 cts. per lb	$2,482,156.80
Total saving	$2,352,021.25

Mr. Adams referred to the fact that the so-called Vanderbilt roads had three different brake heads, and suggested that if this was as near as they could get to uniformity, after getting up perfectly uniform freight cars, the prospect was not very encouraging. If one management could not agree about brake heads, how was it possible for all the roads in the country to come to an agreement about axles, boxes, brasses and other things? He favored the application of brakes to eight wheels instead of four, and that the brakes be applied by means of a lever instead of the ordinary wheel. He also believed in the superiority of the Congdon shoe over cast-iron shoes.

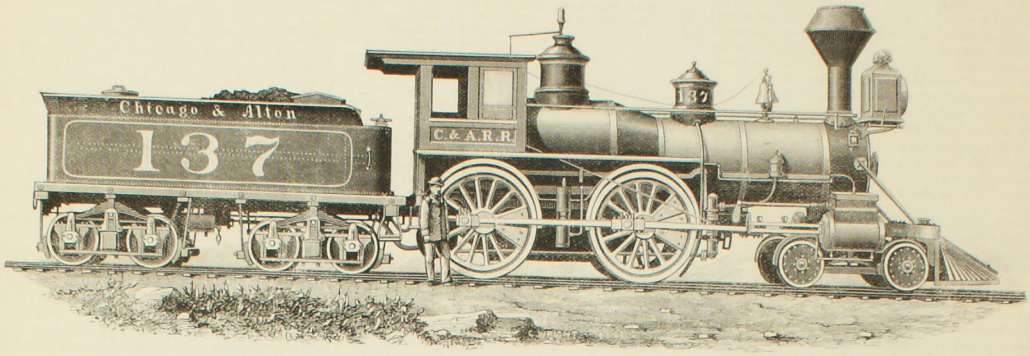
Mr. Smith referred to the need of levers to insure an equal brake pressure on the two pairs of wheels in a truck.

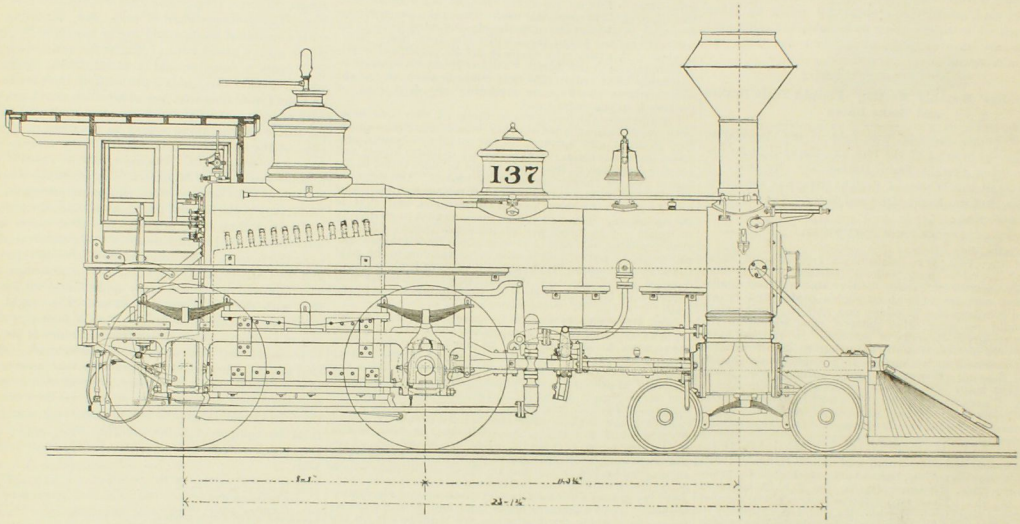
Mr. Adams said that for double brakes he used four levers to a car, which was the only way by which an equal pressure could be secured with the present system of leverage. He had, however, modified the system somewhat by using a dead lever to each truck on some of his double-brake cars. He hoped the committee on the subject would report a plan of brake connection at the next annual meeting, and also a particular pattern of brake head, whether it was patented or not.

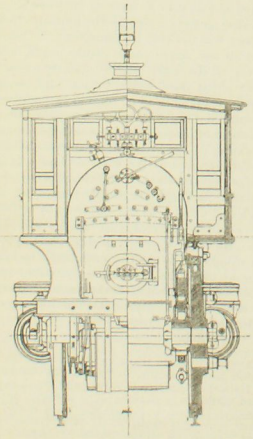
A TRAVELER in Iowa while riding along came to a large sign which implored him to "Look out for the locomotive." He accordingly rode down the track for a better view, and while he was obligingly looking out for it, it came along. He saw it; but he had to sit in the ditch and wait until a freight train of 41 cars passed before he could get back to the other piece of his horse.

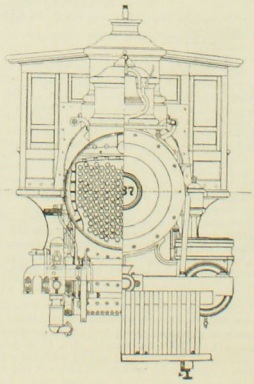
STANDARD PASSENGER LOCOMOTIVE (No. 137.) CHICAGO & ALTON RAILROAD.

Built by Wm. Wilson, Superintendent of Machinery, Bloomington, Ill.









The engravings illustrate the standard locomotive of the Chicago & Alton Railroad Company, as built at their shops in Bloomington, Ill., in 1881, by Wm. Wilson, Superintendent of Machinery.

This locomotive is an excellent illustration of building by templates and gauges. The different parts are so well designed that they not only have a wide application to the different classes of the standard engines built at these shops, but they are readily adapted to the rebuilding of those bought at the different locomotive works. For instance, the eccentrics are all of one diameter and all turned to gauges. The differences in throw are secured by boring the hole. All straps are of one size and pattern and fit any engine. When new eccentrics are put on, and the old links retained, new ends to fit the new eccentrics are welded on to the old rods.

There are running on the road several rebuilt engines whose machinery, and the frames from the pump one way, are the same as before, and the rest was made new according to the standard patterns of the road.

The standard boilers are of two diameters, 48 and 50 in., and of four different lengths of fire boxes, 54, 60, 66 and 72 in. One set of templates is used for each size of boiler for all the different lengths of fire-boxes, except that for each length there are special templates for the side and crown-sheets of the fire-box and the boiler course over it; the flue-sheet, the back-sheet of the fire-box and the boiler head being made from the same templates as the other boilers. This gives a slope of 8 in. to all the crown-sheets without reference to their length.

The whole engine is built without the use of a line in any part of the work. Other peculiarities of construction will be noticed in reading the detailed description of the different parts.

GENERAL DIMENSIONS.

Gauge of track	4ft. 8½ in.
Cylinders	17 x 24 in.
4 Drivers; diameter 64 in. for freight, and 70 in. for passenger engines.	
4-Wheeled truck; diameter of wheels, 28 in. for freight, and 30 in. for passenger engines.	
Two 4-wheel trucks under tender; diameter of wheels 33 in.	
Driving wheel base	8 ft. 8 in
Total wheel base of engine	23 " 1¾ "
Total wheel base of engine and tender	44 " 7⅛ "
Total length, end of pilot to end of back draw-head	53 " 7½ "
Total weight of engine (in working order)	84,000 lbs.
Weight on drivers	56,000 "
Weight on truck	28,000 "
" of tender, with coal and water	62,000 "
Capacity of tank	3,000 gals.
Number of flues	188.
Length of flues	11 ft. 5¾ in.
Diameter of flues (outside)	2 in.
Total heating surface	1,225 sq. ft.
Center of boiler to center line of pedestals	42⅝ in.
Center of boiler to center line of cylinders	49¾ "
Center of cylinder to center of forward pedestal	11 ft. 3¾ "
Center of forward pedestal to throat-sheet	15¼ "
Center of cylinder to center of rocker-box	75 11/16 "
Center of rocker to center of tumbling shaft-box	19 13/16 "
Width of cab	91 "
Length of cab	67 "
Height of cab at center	64½ "
Outside to outside of running boards (back end)	94 "

DETAILED DESCRIPTION.

Fire-box.—Is of Otis steel; the flue sheet is ½ in. thick; the crown-sheet, ⅜ in.; and the side sheets, 5/16 in. The inside dimensions are: width at bottom, 34⅝ in.; at top, 42 in.; length. 72 in.; height at front end, 69 in.; at back, 61 in. The crown-sheet has a slope back of 8 in. and is curved between side sheets on a radius of 127 in., which raises the center 1½ in. The fire-door opening is formed by flanging the inside sheet over the outside one. The water-leg is 3½ in. wide on all sides. Mud ring is of 2¼ x 3½-in. iron. All rivets in fire-box are ¾ in. diameter and 1¾ in. apart, from center to center. There are five fire braces from flue-sheet to boiler-shell in usual way. The fire-box has a shaking grate, except the dumping section in front, and no dead-plate. All fire-box sheets are annealed after being punched.

Boiler-shell.—Except the smoke-arch, which is common iron; the shell is constructed of Otis steel; the front flue-sheet is ½ in. thick and the rest ⅜ in. The main dimensions are: total length of boiler, 20 ft. 5½ in.; from center of smoke-arch to throat-sheet, 12 ft. 7 in.; length out to out of fire-box, 80⅝ in., width out to out of fire-box at bottom, 42¾ in.; length of smoke-arch measured outside, 27¾ in.; outside diameter of smoke-arch, 53½ in.; smallest inside diameter of barrel, 50 in.; greatest width of boiler measured over wagon-top, 52½ in.; wagon-top rises 9 in. above sheet of barrel next adjoining; height of throat-sheet 28¼ in.; total height of back-head, 7 ft. 6 in. Dome on wagon-top is 28 in. outside diameter, and 30 in. high above shell of boiler; center of dome is 45 in. from face of back-head. The ring of dome is cast iron, 2½ x 2¾ in. and placed inside of the dome.

All holes are punched. All longitudinal seams are double riveted, all others are single.

Shell is riveted throughout with ⅝-in. rivets, not less than 1⅝ in. nor more than 1⅞ in. apart from center to center; the flat surface at junction of waste and fire-box are stiffened on eace side by one piece of T iron, 5 x 2½ in. Entirely across the flat surface of the boiler-head, just above the crown-sheet, is placed a bar of 3 x 1½-in. iron which is fastened to the shell with ⅝-in. rivets, 4¾ in. apart. Across the boiler in every other space between crown-bars is a 1½-in. round iron brace attached at either end to boiler-shell by a crow. foot, the center of the braces being 2 in. above the highest point of crown-sheet. Other braces in the usual way.

Stay-bolts.—Are solid, of the best Globe iron, ⅞ in. in diameter, and placed not more than 4½ in. apart, horizontally and vertically, between centers.

Crown-bars.—Are 13 in number, made of two bars of ⅝ x 4½-in. iron, welded in pairs at each end, with an inch space between, have 2¼-in. bearings on side sheets, and are curved parallel to crown-sheet. There are eight ⅞-in. bolts with cupped heads to each bar; between nut on upper end of bolt and crown-bar there is a 7/16-in. washer, 3½ x 2 in., with a lip turne over each side of the crown-bars to prevent their spreadingd The spaces between crown-bars and crown-sheet are 1½ in. high and on each bolt are two ½-in. washers under the crown-bar and a gas-pipe thimble 1¼ in. long next to the crown-sheet. The crown-bars are braced to wagon-top and dome in the usual way.

Flues.—Are of No. 11 wire gauge lap-welded charcoal iron, with copper ferules at both ends; 188 in number; 11 ft. 5¾ in. long; 2 in. outside diameter; bridges in fire-box flue sheet, ¾-in.; in front flue sheet, 5/16-in.

Steam-pipes.—Are oval, 5½ x 3⅝ in. inside, with ball-joint connection to cylinder and crotch pipe. The dry pipe is of wrought iron lap welded, 5½ in. inside diameter and 13 ft. 7 in. long, with ball-joint brass sleeves on each end. The top end of the throttle pipe has a balance poppet throttle valve, operated by bell crank and throttle lever from the cab in the usual way.

Cylinders.—Are 17 in. in diameter, made for a stroke of 24 in., and cast solid with half of the saddle; their total length over the joint is 31¼ in.; the distance from center to center of cylinders, 74½ in.; center to center of valve-stem, 72½ in.; from center line of cylinder to top of frame; 4¼ in.; to steam-chest, 13¾ in.; to face of valve-seat, 14¾ in. to center of valve-stem, 16¾ in. The valve-seat is 19 x 16½ in.; the steam ports are 16½ x 1 1/16 in.; bridges, 1¼ in. wide; and the exhaust ports 16½ x 2 1/16 in. with a 2 in. bridge between them, as. shown in illustrations of valve on another page.

The cylinders are finished by templates and perfectly inter changeable, fitting either side of the engine when completed, and one finished cylinder in hand constitutes a stock.

Pistons.—Are 4¾ in. thick, with spring packing. Packing-rings are ⅝ x ⅜ in.; they are first turned 17 11/16 in. outside and 16½ in. inside diameter, then cut and sprung together to lap 1½ in. and turned to the diameter of cylinder. Piston rod is 46½ in. from center of piston to center of pin in crosshead, and 2⅝ in. in diameter, with a taper fit and shoulder in crosshead secured with tapered steel key 1⅞ x 7/16 in. The seat of piston rod is 3 3/16 in. in diameter on front side, tapering through to 2 3/16 in., the piston rod being driven through the piston head from front side. The tapers in piston rod are made in this way so that the strain that loosens one will tighten the other. Jerome patent packing is used on all piston rods and valve stems.

Guides.—Are of steel, four on a side, 47⅝ in. long, 2½ in. wide, 2 in. thick in the middle, and 1⅝ in. at the ends, and secured to the back cylinder head by guide blocks 4 in. long, with two ⅞-in. bolts, and to the guide yoke by guide blocks 2½ in. long, with one ⅞-in. bolt.

Guide Yoke is of wrought iron varying from 7 to 13 in. wide and 1 in. thick; made in one piece running across the frames and fastened to each rocker-box by 3 bolts, 2 in flange and 1 to the hub of the rocker-box over the pump, and each rocker-box is fastened to the frame by 3 bolts; all bolts ⅞-in. There are no braces from waist of boiler to guide-yoke or any part o frame.

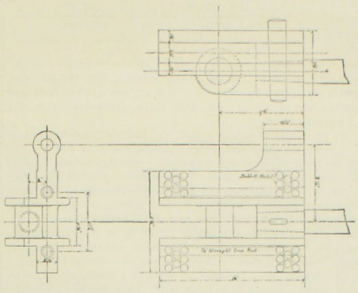


Fig. 1.—Crosshead.

Crossheads are of cast iron with ⅞-in. wrought-iron rod riveted in through the bearings as shown in Fig. 1. When this rod is put in it is heated to a red heat about ⅛ its length and then riveted in to fit the flaring holes. The shrinkage in cooling makes it a very firm support against breaking. The rods are put in before planing the crossheads otherwise their shrinking would warp the faces. This device originated with Mr. Wilson, and is not patented. He has used it several years and never had one break.

Rods are of hammed scrap iron; length of main rods from center to center is 7 ft. 5¼ in.; the body is 4 x 1⅞ in. at back end, and 3⅛ x 1⅞ in. at the front; the stub ends are 4½ x 2¾ in. and 3½ x 2½ in. respectively.

Parallel rods are 8 ft. 8 in. between centers, of uniform section, 3⅜ x 1⅞ in. with stub ends 3¾ x 2½ in.; the straps on all the rods are 1¾ in. thick and held by two 1-in. taper bolts. All rods have single keys.

Driving Wheels.—Are 4 in number, of cast-iron centers 63⅛ in. in diameter, with steel tires 3½ x 5½ in., shrunk on; the length of the hub is 7⅝ in.; the main pin journals are for main rods 4 in. long and 4 in. in diameter, for parallel rods 3½ x 3 in.; back crank-pins are 3½ x 3 in.; crank-pin holes are bored straight 4¼ in. in diameter and pins pressed in and riveted.

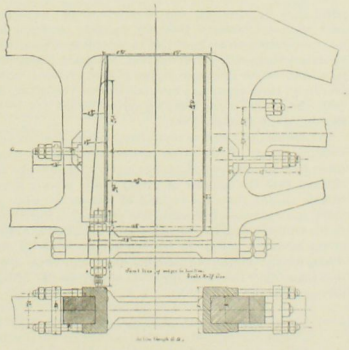


Fig. 2.—Shoe and Wedge Binder.

Driving Axles are steel, 70¾ in. long over all; diameter of axles at center is 6¾ in.; the diameter of the wheel seat and journal is 7 in., of eccentric seat 7⅛ in.; the length of wheel seat is 7⅝ in.; of journal bearings, 8⅛ in.; of eccentric seat, 9 in.; distance between face of driving wheel hubs is 55 in.; over hubs, 70¼ in. The wheel seat has a ¼-in. collar ⅛ in. wide let into wheel hub, the corners being filleted to a ¼-in. radius.

Driving Boxes are cast iron, and fitted with cellars, shoes and wedges, as shown in the plan and Fig. 2. Brasses are 1½ in. thick at the top, made in three sections, dove-tailed into the boxes, bored 7 in. in diameter, and scraped and closely fitted to the journals.

Frames are of hammered iron; the upper part of back frame is 4¾ in. deep; the lower, 2 in., and the forward frame 4¾ in.; the width throughout is 3 in.; the distance between frames is 44 in. The pedestals are made for one stationary shoe and one movable wedge, the latter on the backward side. The shoes and wedges are held in position by binders and bolts, as shown in Fig. 2.

Carrying Gear.—Equalizers are hammered wrought iron, pivoted on a steel key fitted into a wrought-ironed stand attached to the frame. Driving springs are made of 13 leaves, 11 of them are ⅝ x 3-in. steel, and the top and bottom leaves are of 7/16 x 3-in. steel, and measure 36 in. from center to center of spring hangers. There are 8 cast-iron expansion angle-irons, 14 in. long and ⅞ in. thick, fitted to the frames and secured to side of fire box by three ⅞-in. studs in each angle-iron. Expansion buckles are 4 in number, of wrought iron, 6 x ⅞ in., fitted to frame and secured to fire-box by six ⅞-in. studs, three above and three below the frame. There are 4 wrought-iron expansion lugs 6 x ⅞ in., which are held to fire box by three ⅞-in. studs and fitted to the lower limb of the frame.

Valve-Motion.—Is the shifting link motion. The skeleton links, slide blocks, saddles, pins, lifters, lifting shaft and eccentric blades are of hammered iron and case hardened; the rocker-arms are of hammered iron; all holes and bearing-pins have steel bushings; the eccentrics are 15½ in. in diameter and 3 in. thick, cast in halves, have 5 in. throw and are held together by two ⅞-in. studs. They are held to driving axles by two set-screws and one ⅝-in. feather.

The valves are the Wilson patent valve with Robinson's method of balancing. A description of this valve and its advantages, illustrated by drawings, is given on another page. It has 1 1/16 in. outside and ¼ in. inside lap and 5 in. travel at full link. When the ordinary valve is used it has 5½ in. travel, ⅞ in. outside, and 1/16 in. inside lap.

The dimensions are: Of link, extreme length, 23⅜ in.; between centers, 12 in.; back-set of link saddle-pin, ⅞ in.; face, 2½ in.; throw, 5 in.; and radius, 60 in.; length of eccentric rods, 56⅞ in.; length of rocker arms, 9½ in.; lifter, 14 in.; tumbling-shaft arms, horizontal, 20 in.; vertical, 24 in.; from center of driving axle to center of tumbling shaft, 40⅝ in.; to center of rocker box, 60 in.; the tumbling shaft center is 8¼ in. above the top of frame; the rocker arm center is 3 in. above; back-set of lower rocker arm, ⅝ in.; and diameter of valve-stem, 1½ in.

Pilot.—Is made with sloping bars resting their lower ends upon the horizontal bar which forms the bottom of the pilot.

Running Boards.—Are of 2-in. plank, bound on the outside of each with 2 x ¼-in. iron and secured to the boiler shell by wrought-iron brackets.

Injectors.—On left side, is one of Friedman's No. 8, non-lifting, old style injector.

Pumps.—On right side, driven from lug on the inside of the crosshead; the plunger is 2¼ in. in diameter; the barrel is entirely of cast iron, with cored holes; it requires but little fitting and is painted.

Illustrations of the engine and tender trucks and their details, the cab and its details, and the tender frame, will be given in future issues of the CAR-BUILDER.

Recent Reports of Railway Rolling Stock.

Lehigh Valley.—268 engines; 73 passenger and 41 baggage and express cars; 1,780 box, 100 lumber, 13 stock, 50 bark, 487 flat, 1,062 gondola, 44 lime, 150 tunnel coal, 24,465 coal and 79 caboose cars; 1 pay car, 30 tool and wreck cars, 2 ram cars, 200 gravel, 14 supply and 5 water cars—total number of cars 26,996.

Pennsylvania & New York.—53 engines; 631 box, 97 stock, 268 flat and gondola, 4,151 coal and 31 caboose cars; 4 tool and derrick, and 33 gravel cars; 6 shop trucks. Additions were 2 locomotives, 1 flat, 1,198 coal and 1 caboose car; 2 gravel cars and a shop truck. Passenger equipment is furnished by the Lehigh Valley Company.

New York, Lake Erie & Western.—544 engines; 225 first-class passenger, 78 second class, 102 baggage, mail and express, 12,168 box, 1,216 stock, 1,928 gondola, 3,762 gondola dump, 2,229 eight-wheel coal, 1,360 four-wheel coal, 715 flat, 261 oil tank and 41 milk cars; also 241 service cars, including 165 caboose and 50 gravel cars—total, 24,293.

Portland & Ogdensburg.—9 locomotives; 18 passenger and baggage cars; 110 box, 152 flat and 5 caboose cars; 1 crane car and 3 snow plows. Additions last year were 1 locomotive, 24 freight cars and 1 crane car.

New York, Ontario & Western.—73 engines; 32 passenger, 8 emigrant, and 20 baggage, mail and express cars; 429 box, 9 milk, 37 stock, 576 flat, and 411 coal cars; 17 service cars—total cars, 1,539.

Denver & Rio Grande.—170 engines; 134 passenger train cars and 4,483 freight cars. Of these 29 locomotives, 24 passenger train cars and 553 freight cars are owned by the company; the rest are held through equipment trusts, on which the sum of $300,000 has been paid.

Long Island.—79 engines, 229 passenger train cars and 511 freight cars.

Illinois Central.—224 engines; 112 passenger, 12 smoking, 12 baggage and smoking, 17 sleeping, 10 postal and 37 baggage, mail and express cars; 3,296 box, 50 Blue Line box, 111 combination, 51 fruit, 95 refrigerator, 4 powder, 583 stock, 278 flat, 1,373 coal and 110 caboose cars; 2 officers' cars, 1 pay-car and 18 service cars. During the year 11 engines, 12 passenger and 183 freight cars were added to the equipment. Five engines and a number of cars were built to replace old ones worn out. A large number of cars were rebuilt.

Utica & Black River.—22 engines; 23 passenger, 10 baggage and 277 freight cars—total cars, 310. Increase during the year, 2 locomotives and 67 freight cars; 100 more freight cars are contracted for.

Brighthope.—3 engines; 1 passenger, 2 box, 60 flat, and 130 four-wheel coal cars.

Richmond & Alleghany.—19 engines; 16 passenger, 12 baggage, 225 box, 413 flat, 25 stock, 50 coal and 30 low construction flat cars—total cars, 771. Greatest locomotive mileage, 44,654; average, 29,283.

DETAILED COST OF ONE STANDARD ROAD ENGINE (CLASS A) CHICAGO & ALTON RAILROAD.

Specifications.		Cost of Labor.									
No.	Name.	Blacksmiths.	Machinists.	Boilermakers.	Coppersmiths.	Carpenters.	Painters.	Total cost of labor.	Cost of material.	Cost of labor and material.	No. of Specification.
*	Standard (A) Boiler	$89.25	$31.46	$394.99	.....	.....	.....	$445.70	$1,401.73	$1,847.43	*
6	Smoke Stack	1.00	2.36	6.40	.....	.....	.....	9.75	33.86	43.61	6
7	Ash Pan	5.25	.75	6.00	.....	.....	.....	12.00	19.00	31.00	7
8	Frames	155.95	94.55	.....	.....	.....	.....	250.50	248.55	499.05	8
9	Foot Board	1.96	14.90	1.03	.....	.....	.....	18.79	48.34	67.13	9
10	Cylinders	1.17	97.88	.....	$ .95	.....	.....	100.00	144.07	244.07	10
11	Valve Motion	114.32	135.68	.....	.....	.....	.....	250.00	71.02	321.02	11
12	Pumps and Injector	10.54	15.68	.....	3.78	.....	.....	30.00	176.20	206.20	12
13	Driving Boxes	1.30	48.61	.....	.....	.....	.....	50.00	32.01	82.01	13
14	Driving Wheels	2.43	97.57	.....	.....	.....	.....	100.00	621.76	721.76	14
15	Truck	56.00	19.00	.....	.....	.....	.....	75.00	256.17	331.17	15
16	Steam Pipes	8.00	22.00	.....	.....	.....	.....	30.00	57.29	87.29	16
17	Pilot, Cab, Running-Board, etc	20.77	1.05	92	.....	$65.24	$12.02	100.00	60.31	160.31	17
18	Carrying Gear	51.10	24.70	.....	.....	.....	.....	75.80	83.34	159.14	18
19	Pistons	28.59	71.41	.....	.....	.....	.....	100.00	77.80	177.80	19
20	Rods	37.97	62.03	.....	.....	.....	.....	100.00	110.54	210.54	20
21	Boiler Trimmings	31.37	45.67	2.45	9.34	10.17	1.00	100.00	286.45	386.45	21
22	Engine "	45.94	8.47	14.43	95	5.21	.....	75.00	80.38	155.38	22
23	Tank	15.93	3.93	127.97	.....	.....	18.13	165.96	392.60	558.56	23
24	Tender Trucks	23.48	25.00	.....	.....	13.03	2.96	64.17	406.17	470.34	24
25	Tender Frame	13.00	.74	.....	.....	35.07	1.24	50.00	97.04	147.04	25
26	Erecting	.....	250.00	.....	.....	.....	.....	250.00	.....	250.00	26
27	Painting	.....	.....	.....	.....	.....	50.00	50.00	12.22	62.22	27
	15 per ct. added for dead labor.	.....	.....	.....	.....	.....	.....	375.40	.....	375.40	
		$715.41	$1,073.34	$485.18	$15.02	$128.67	$85.05	$2,878.07	$4,716.85	$7,594.92	

* Includes Specifications Nos. 1 to 5, inclusive.

SPECIFICATIONS OF DETAILS AS PER NUMBERS IN TABLE.

1. *Fire Box*, includes the box finished on floor; also, driving rivets in mud ring at bottom of box; also, mud ring and fire box door and all material for same.

2. *Boiler Shell*, includes the shell, finished with dome and smoke arch on and all material for same.

3. *Stay Bolts*, includes all work on the bolts before and after being put in; also, tapping out the holes, and all material for same.

4. *Crown Bars*, includes making and putting on; also, all braces inside of boiler and all material for same.

5. *Flues*, includes all work on flues and all material for same.

6. *Smoke Stack*, includes the stack, finished and on, and all material for same.

7. *Ash Pan*, includes the pan, finished and on, with all rods, levers and dampers complete, and all material for same.

8. *Frames*, includes frames finished all ready to put up, with pedestal braces complete, and brace across frame that bumper beam bolts to, and all material for same.

9. *Foot Board*, includes foot board and cab seat supports, chafe iron and side plates fitted, complete, and all ready to put up, with all material for same.

10. *Cylinders*, includes all work on cylinders, cylinder saddle, cylinder heads and casings, steam chests, steam chest covers and casings, piston and valve rod glands and bushings, finished complete, all ready to put on, and all material for same.

11. *Valve Motion*, includes valves, yokes, rods, rocker arms and boxes, links, lifters, tumbling shaft, tumbling shaft arms and boxes, reach rod, reverse lever, quadrant, counter balance, spring and casings, eccentrics, eccentric straps, and eccentric rods all finished and ready to put up, and all material for same.

12. *Pumps*, includes injectors complete, and pumps, plungers, air chambers, valves, feed pipes, check pipes, checks and casings, lazy cock, jet cocks, hose and nuts fitted complete, and all ready to put up, and all material for same.

18. *Driving Boxes*, includes the boxes, cellars and caps, the wedges, wedge bolts and nuts, fitting boxes on the axle, and all material for same.

14. *Driving Wheels*, includes wheels, axles, tires, crank pins, all fitted complete ready for use; also, putting eccentrics on axle, and all material for same.

15. *Truck*, includes truck, center pin and stay chains, complete, ready for use, and all material for same.

16. *Steam Pipes*, include steam, exhaust, dry, throttle and crotch pipes, with throttle valve and all levers, pins, rods and stuffing box, and gland for working valve, all fitted complete, and all material for same.

17. *Pilot, Cab Running Board, etc.*, includes pilot, finished on floor, with all braces and bolts complete, ready to put on; cab finished on floor, all ready to put on; running boards finished and ready to put on; and front bumper beam finished and ready to put on. This specification also covers putting on all these permanently and their fastenings, with getting out and putting on lagging on boiler and dome, and all material for same.

18. *Carrying Gear*, includes all work on driving springs, hangers, equalizers, equalizer standards, expansion lugs, and angle irons, made, fitted and put on, and all material for same.

19. *Pistons, etc.*, includes all work on pistons, piston rods, cross heads, guides, guide blocks, guide yoke, finished complete, and all ready to put up, and all material for same.

20. *Rods*, includes all work on main and parallel rods; also fitting brass on pins, and all material for same.

21. *Boiler Trimmings*, includes all work on front end and door, lamp brackets, number plate, hand rails, bell frame, sand box, dome casings, dome cover, safety valves, whistle, water gauge, gauge cock, heater cocks and pipes, blow-off cock, blower cock and pipes, steam gauge, petticoat pipe, grates and levers, putting on jacket, headlight, signal light, and all material for same.

22. *Engine Trimming*, includes all work on wheel covers, cylinder cocks and rigging to work them, lazy cock rigging, draw bars back and forward, forward draw bar casting, bumper covering, smoke arch braces, braces from boiler to frame, wooden deck, check chains between engine and tender, and all material for same.

23. *Tank*, includes all work on tank finished complete. All work above the frame is charged to tank, and all material for same.

24. *Tender Trucks*, includes all work on tender trucks, with male and female center pins, check chains, and all material for same.

25. *Tender Frame* includes all work on tender frame, with forward and back draw castings, and all work above the trucks and below the tank, and all material for same.

26. *Erecting*, includes labor only of putting up finished work. No material is charged to this specification.

27. *Painting*, includes all painting and work appertaining thereto, and all material for same.

Locomotive Boiler Joints.

To the Editor of the National Car-Builder:

The ordinary lap-joints, single riveted, have but 56 per cent. of the strength of the solid sheet. Thus, in this form of joint but a trifle over one-half of the total strength of the sheet is available. A scarf-welded joint possesses the full strength of the sheet, but this form of joint is both expensive and uncertain, although it is to be hoped that the longitudinal seams of locomotive boilers will eventually be so made.

In 1838, Sir Wm. Fairbairn ascertained these facts relative to riveted joints. Mr. Brunel also experimented in this direction. He used plates ½ in. thick and 20 in. wide, but jointed with welts or reinforcing pieces on the back 9 in. wide and ⅜ in thick on both sides, and chain or square riveted. Two pairs of similar plates were thus joined with 11/16-in rivets, 20 rivets being used in each pair of plates. On trial one pair pulled apart at 153 tons, the failure being due to the shearing of the rivets. The other pair of plates failed at 164 tons, one of the plates tearing through at the rivet holes. The total sectional area of ten 11/16 rivets is 3.75 square inches, and as the rivets were sheared in two places, the resisting area equals 7.5. The fractured plate represented 10 square inches of metal and 8.25 square inches, less the holes. The rivet area was, therefore, about 9 per cent. less than the solid area through the rivet holes. Other similar plates, except that the rivets were ¾ in., failed through the rivet holes at 167 and 147 tons. The total sectional area of ten ¾ rivets is 4.5 square inches, or 9 square inches for the double shear. The sectional area of the plate at the rivet holes is 8.125 square inches, so that the rivet area was in excess of the plate area some 10 per cent. As the mean of the different size of riveted joints (11/16 and ¾) was 158.5 and 157 tons, the two joints were practically equal. It therefore appears that the shearing area of rivets should equal the area of metal between the holes in order to obtain the maximum strength of joint. If in this form of joint the rivets are staggered, the strength of the joint is slightly increased. With this same style of joint, riveted, however, with three rivets in a row, one behind the other, in each sheet, the mean breaking strength was 173 tons, showing a still stronger joint.

The double plate welt or reinforcing pieces doubles the resisting power of the rivets against shearing, as compared with the ordinary lap joint; and with double the resistance half the number of rivets would answer if no trouble ensued from the calking of the sheets with so much space between the supporting points, *i. e.*, the rivets. In the ordinary double-riveted lap joint about 30 per cent. of the section is taken up by the rivets, while in the double welt or reinforcing joint not more than 19 per cent. is so taken up. The following table shows results of experiments with

RIVETED AND WELDED JOINTS.

Kind of Joint.	Ultimate Tensile Strength of Joint.			
	½-in. plate.	7-16 in. plate.	⅜-in. plate.	Mean of 3 thicknesses.
Entire plate	100	100	100	100
Scarf-welded	Faulty	106	102	104
Lap-welded	50	69	66	62
Single hand riveted	40	50	60	50
Single hand riveted snap head	50	52	56	53
Single machine riveted	40	54	52	49
Single riveted countersunk head	44	50	52	49
Double riveted snap joint	59	70	72	67
Double riveted countersunk snap head	53	72	69	65
Double riveted, single welt, countersunk snap head	52	60	65	59
General average	48	60	62	57

ULTIMATE AND WORKING STRENGTH OF JOINTS.

Entire plate taken at 100.

Quality of Plate and Nature of Joint.	Percentage of Tensile Strength.	Tensile Strength. Ultimate strength per sq. in. of entire section of plate.		Working strength per sq. in. of entire section taken at 1-5 ultimate strength.	
Best Low Moor plate.	Per cent.	Tons per sq. in.	Pounds per sq. in.	Tons per sq. in.	Pounds per sq. in.
Entire plate	100	25	56,000	5	11,200
Scarf-welded	100	25	56,000	5	11,200
Lap-welded	66	16.5	39,960	3.3	7,392
Double riveted, double welt	80	20	44,800	4	8,960
Double riveted, single welt	65	16.25	36,400	3.25	7,280
Double riveted, lap joint	72	18	40,320	3.6	8,064
Single riveted lap	60	15	33,600	3	6,720
Best Staffordshire.					
Entire plate	100	20	44,800	4	8,960
Scarf-welded	100	20	44,800	4	8,960
Lap-welded	66	13	29,120	2.6	5,824
Double riveted, double welt	80	16	35,840	3.2	7,168
Double riveted, single welt	65	13	29,120	2.6	5,824
Double riveted lap	72	14.5	32,840	2.9	6,496
Single riveted lap	60	12	26,880	2.4	5,376

In the order of strength the joints range as follows:

1 scarf-welded	100 per cent.
2 double-riveted, double welt	80 "
3 " " lap	72 "
4 lap-welded	66 "
5 double-riveted, single welt	65 "
6 single-riveted lap	60 "

These percentages are intended for plates ⅜ in. and under.

The working strengths of the best English and American boiler plates are:

Yorkshire plates, per sq. in. of entire section	11,000
Staffordshire, per sq. in. of entire section	9,000
American " " "	14,000
" ordinary, per sq. in. of entire section	12,000

The working strengths of the joints are:

1 scarf-welded, per sq. in. of entire section	11,000
2 double-riveted, double welt	9,000
3 " " lap	8,000
4 lap-welded	7,400
5 double-riveted, single welt	7,300
6 single riveted lap	6,700

It follows from the above tables that the scarf-welded joint is as strong as the entire sheet; the lap-welded joint has 5/8 or 62 per cent. of the strength of the entire sheet. The varieties of single riveted joints are equal, although they are but half the strength of the solid sheet, save the snap-headed, which is rather stronger. The ordinary lap is the stronger of the double-riveted; the double welt has 84 per cent. of the solid sheet, the single welt being weaker. The 3/8-in. lap-welded joint has 2/3 the strength of the entire plate, and the ½-in. has but half the strength. The experiments further show that the 7/16 and 3/8-in. lap-jointed sheets are equal, and that they are more than ¼ stronger than the ½-in. plate, relatively, which shows that a boiler of 3/8-in. iron is as strong as one of ½-in. iron when riveted in the ordinary way.

The holding strength due to the grip of the rivet heads is due, of course, to the friction, and the resistance is as follows:

Shank of rivet 10- in. long. Resistance 4¾ tons.
Shank of rivet 15-8 in. long. Resistance 5½ tons.
Shank of rivet 23-8 in. long. Resistance 8 tons.

The grip, therefore, increases with the length of the rivet, and might be of such a length as to exceed in strength that of the metal, and result in pulling the heads off. The strength of the rivets to resist shearing is decreased in proportion to the increase of grip, and the total strength of the joint is not, therefore, apparently increased by the shrinkage.

Punching sheets, according to Fairbairn, is a source of weakness, not only by the reducing of the section, but from the mechanical disturbance of the metal between the holes, although the shape of the punch has much to do with this.

In eight experiments by Fairbairn the highest tensile strength of solid sheet was 61,579 lbs., and the lowest 43,805 lbs. per sq. in., and the strength of the same after punching ranges between 45,743 and 36,606 lbs., which shows a loss, due to the action of the punch in addition to the loss of section through the holes.

The staying of flat surfaces is very important. The stiffness of the sheets is of no practical account, as the stays above resist the strain.

The following table shows the ultimate and working strengths of tie rods:

Quality.	Diameter in inches.	Ultimate Strength. Per sq. in. of section.	Ultimate Strength. Whole section.		Working strength taken at 1-5 ultimate strength.	
			Tons.	Tons.	Lbs.	Tons.	Lbs.
Staffordshire	⅝	25	15	33,700	3	6,700
	1		19.6	44,000	4	8,800
	1 1/16		25	56,000	5	11,200
	⅞		16.8	37,700	3.4	7,500
American	1	28	22	49,300	4.4	9,800
	1 1/16		28	62,700	5.6	12,500
Government test	⅞	30	18	40,400	3.6	8,100
	1		23.5	52,800	4.7	10,500
	1 1/8		30	67,200	6	13,400

When the full section of rod is maintained, the above table is correct; if threaded on the original diameter a deduction of 1/10 must be made. Mr. Brunel's experiments

THE WILSON SLIDE-VALVE.

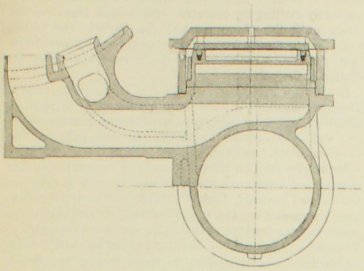


Fig. 1.

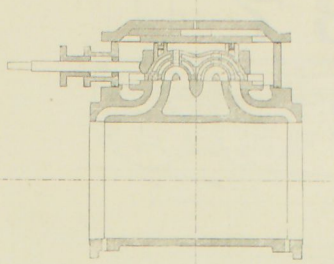


Fig. 2.

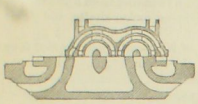


Fig. 3.

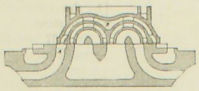


Fig. 4.

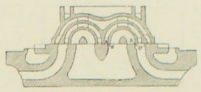


Fig. 5.

show that the strength of stays increases proportionately as the diameter is less.

Diameter.	Breaking weight.	Strain per sq. in.
1¼	29 tons	23 tons.
1⅛	21 "	21 "
1	20 "	25 "
⅞	15¾ "	25 "
¾	12 "	27 "
⅝	10¼ "	32 "

Mr. Fairbairn found in the strength of stay bolts, that a ¾-in. copper bolt with enlarged end screwed into ⅜ copper plate, and riveted over the end, broke at 7.2 tons tensile strength.

That a ¾-in. iron bolt screwed and riveted into ⅜ copper plate, failed with a load of 10.7 tons by the rivet head breaking off and stripping the thread in the sheet.

That a ¾-in. iron bolt screwed without riveting into a ⅜-in. copper plate, was pulled out with 8.1 tons, stripping the thread in the plate.

That a ¾-in iron bolt screwed and riveted into ⅜ iron sheet, failed by fracture across the shank with 12.5 tons, the screw and plate remaining uninjured.

These results appear as follows:

1. Copper into copper screwed and riveted. 7.2 tons.
2. Iron into copper screwed and riveted, 10.7 tons.
3. Iron into copper screwed only, 8.1 tons.
4. Iron into iron screwed and riveted, 12.5 tons.

The Wilscn Slide-Valve.

This valve was designed for the purpose of improving the efficiency of a slide-valve moved by the link motion, in regard to the admission and escape of steam so as to enable it to work the steam more expansively, and to avoid the excessive compression of the ordinary slide-valve.

The engravings show the supplementary channels or ports cast in the valve to secure a double opening for admission and release, which is especially desirable when the valve is working short, as it usually does while a locomotive is running at high speed. In this respect it secures for both exhaust and admission the advantage gained for the latter by the Allen valve, described in the CAR-BUILDER of last June.

Fig. 1 is a transverse section through the center of the cylinder and valve.

Fig. 2 shows a longitudinal section through the cylinder, the left-hand half being taken through the center of the valve, and the right-hand half about two inches from the center.

Fig. 3 is a sectional view, showing the valve at its extreme travel.

Fig. 4 shows the position of the valve at the instant the port *A* opens for the double admission of steam into the cylinder. It will be noticed by a glance at the diagram that steam is not only admitted at the end of the valve, as is the case with the ordinary valve, but it is also taken from the opposite end of the chest through the supplementary passage *B*, into the port *A*. This double admission secures a higher pressure in the cylinder at the early part of the stroke, and enables it to work the steam more expansively, and consequently it uses less steam and works more economically than with the ordinary valve in doing the same work.

Fig. 5 shows the position of the valve at the instant the port *C* opens for the double release of steam from the cylinder at the point *D*, as in the common valve, and also through the supplementary passage at *E*.

Another advantage claimed for this valve is, that the supplementary passage *B*, Fig. 4, when the exhaust opens, contains 174 cubic inches of steam a little above terminal pressure, which is held until after the closure of the exhaust, when it is admitted into the cylinder, making a cushion of steam instead of air for compression.

The freer admission and quicker exhaust through double openings, and the reduced compression, permit a greater lap on both inside and out, which increases the degree of expansion.

The greater expansion of the steam secured by the use of this valve, enables the engine to do the same amount of work at a point of cut-off one-third or more shorter than with the common valve.

The valve from which these drawings are made is the one in engine 137, illustrated on another page. It does most of its work "cutting off" at the first notch, admitting steam during only three inches of the stroke of the piston, from which point the steam is expanded during 12¼ inches of the stroke before being released. In this notch the engine does good work, taking seven heavy coaches over a level track at a speed of over 40 miles an hour.

Tests between like engines, except the valves, have shown that this valve will save over 20 per cent. of the water evaporated and fuel burned by the engines using the ordinary slide valve.

The dimensions of the valve seat are: Length across cylinder, 19 in.; across ports, 16½ in.; out to out of steam ports, 12¾ in.; the width of steam ports is 1 1/16 in.; exhaust ports, 2 11/16 in.; bridges between steam and exhaust ports, 1¼ in.; the bridge in center between exhaust ports, 2 in.; and the length of all ports is 16½ in.

The length of valve is 19 in.; width 15⅛ in.; width out to out of supplementary or auxiliary steam ports is 14 3/16 in. The dimensions of valve are from end to supplementary port, 2 11/16 in.; width of supplementary steam port, 3 11/16 in.; width of bridge between supplementary steam port and exhaust port, 5/16 in.; width of supplementary exhaust port, 7/16 in.; width of bridge between supplementary exhaust and main exhaust ports, ⅝ in.; the main exhaust ports are 3 7/16 in. with a 1⅛-in. bridge in center; the bridge between main exhaust and auxiliary exhaust port, ⅝ in., width of auxiliary exhaust port, 7/16 in.; and width of bridge in center of valve, ⅝ in., one-half being on each side of center line valve. It has 1 1/16 in. outside and ¼ in. inside lap, and 5 in. travel and 3/16-in. lead at full link.

This valve was designed and patented by Mr. Wm. Wilson; Superintendent of Machinery of the Chicago & Alton Railroad at Bloomington, Ill.

Railways and the Timber Supply.

To the Editor of the National Car-Builder:

In calling attention to our almost endless material resources, the press of the country has largely overestimated our future timber supply. The creation of the belief that it would always be equal to the demand has worked incalculable mischief by causing an extravagant consumption and an indifference to forest protection that a wise foresight would have avoided years ago. When the yearly supply of timber for all purposes scarcely made a gap in our forests, our noble trees were considered an incumbrance to be got rid of in order that the land might be tilled. But now, when the axe and fire have done their work, farmers are turning their attention to cultivating the prairies and sparing the timber, as they should and would have done long ago but for the scarcity of timber on the prairies for farming purposes. Wire fencing has been largely substituted for rails, and although this method is considered barbarous by some, it is proving of signal advantage to railway interests by diverting emigration from timbered lands to the prairies, and thus saving the timber.

As the world progresses, and any article of prime necessity becomes scarce, some means are discovered to supply the deficiency; but it is not easy to say what is to take the place of wood in car construction. Iron and steel are of course largely relied upon, but the use of wood will continue to be a necessity for a long time to come. Railroads are large consumers of timber, and they should look ahead for their future supply, and especially should those having extensive land grants of timber take care that none is wasted. Those whose grants are mostly prairie lands will do well to go into the tree-planting business, which has already proved to be profitable. These suggestions may be regarded as premature by those who are not aware of the fact that a great deal of inferior timber is now used in car building. This must be owing to a scarcity of good timber, or else car-builders are not as honest as they should be. This is said with reference more particularly to cars "built to sell." Putty and paint, like wealth, covereth a multitude of sins in some shops, and is, no doubt, mostly due to a growing scarcity of good timber in certain localities, causing the builders to fall into bad habits, especially when goaded by sharp competition and a disposition on the part of consumers to scale down prices to starvation point.

A lumberman who has supplied a large car manufacturing concern with lumber for several years, confined himself to a certain territory to get the timber to fill his contracts. At first he handled only the finest quality, but as that became exhausted he sent forward an inferior grade, and so on until now he fills the bill with "culls" from the same territory that he has already culled over several times. It is true that there is as yet no very pressing need for using inferior timber, but so long as it is countenanced by the purchasers of cars, it is morally certain that a better quality will not be used, even if it can be had at reasonable prices. But a small portion of the timber consumed by railroads goes into cars, and this should be of the best.

The forests now standing are being rapidly thinned out for manufacturing purposes, and by the annual forest fires. Only a few years ago a leading paper in Michigan urged everybody to settle in that State on account of the "immense wealth of the endless forests;" but a number of the same paper, just issued, contains this paragraph: "A Kansas tree planter has 45,000 trees planted since 1875, that are 30 feet high and 30 inches in circumference. The way Michigan forests are being removed and destroyed will soon compel us to turn our attention to tree planting." The agricultural press calls upon farmers to practice economy in the use of timber, and as farmers may be regarded as the producers of car timber, this is a further evidence of the coming scarcity, and points to the necessity of measures to guard against it, for railroad uses especially.

There is some complaint that unsound, knotty, unseasoned, cross-grained and porous or "brash" timber is used by car-builders, but, as before stated, this is encouraged by the readiness with which cars are sold to meet the increasing demand. The yellow pine forests in the region of Puget Sound are said to afford timber equal to the best Eastern white oak for railway uses; but the fir is at present practically out of our reach, and even when it becomes accessible, the supply will be limited, and can not be depended on as a reserve. It is well known that second-growth timber for manufacturing purposes is superior to that of primitive growth, and it is not at all unlikely that timber for railway rolling stock, carriages, agricultural implements and machinery, and for other purposes where strength and durability are the chief requisites, will be produced periodically by tree planting. At all events, it behooves the consumers of hard wood timber to encourage this mode of repairing the waste, and putting an end to the use of inferior woods in car construction.

WM. S. HUNTINGTON.

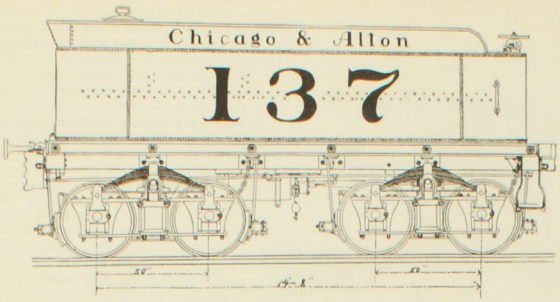
The First Pullman Cars.

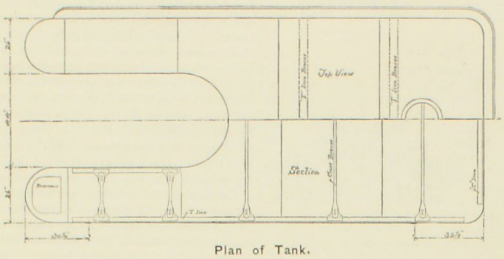
The Chicago *Tribune* of Feb. 17 says: "It has been the general impression that the Michigan Central and the Chicago, Burlington & Quincy railroads were the first roads to run dining-cars on their trains. Investigation, however, shows that to the Chicago & Alton belongs the honor of having first inaugurated the dining-car system. The Michigan Central and Burlington did not put on dining cars until 1875. The Chicago & Alton put dining-cars on its line between Chicago and St. Louis in 1868. The cars at that time were run clear through, and not put on, as at present, during meal hours. These cars were constructed and managed by Mr. Pullman, and the price for a meal was $1. Afterwards the Alton acquired an interest in the dining-cars, and about four years ago it assumed full control of them, and reduced the price for a meal to 75 cents, the same as is now charged by all the other lines.

"The Alton is also the first road which ran Pullman sleeping-cars. The first Pullman sleeper was placed on this line in 1859. This sleeper was called the 'Pioneer,' and was built in an old shanty on Harrison street, in this city, by Pullman & Field. The 'Pioneer' is still running on the Alton, although it has been entirely remodeled and reconstructed. The first Pullman palace cars with folding berths were placed on the Alton in 1872. These cars were much heavier than those now in use. The Alton also claims the credit of having placed on its line the first Horton chair-cars, which was in 1877.

"When the Alton adopted these new features it was ridiculed by other lines, as it was not then believed that they would ever become popular. Their success, however, was soon established, and all the lines, one after another, were compelled to make the same improvements."

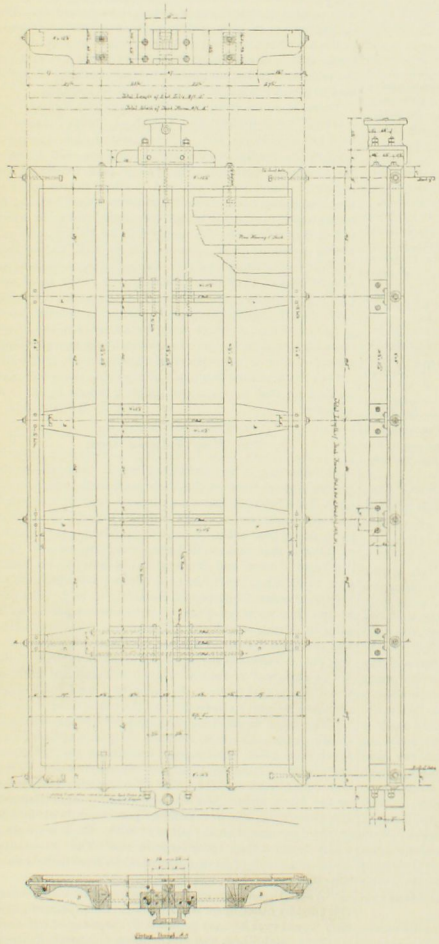
TENDER AND TANK FOR STANDARD PASSENGER ENGINE (137), CHICAGO & ALTON RAILROAD.





Plan of Tank.

Total Length of Frame, cut to out of End Sills..... 18 ft. 10 in. Total Length of End Sills..... 8 ft. 3 in.
Total Width of Frame.....8 ft. 5 in.



Tank Frame.

Luxury in New York.

The luxury and perfection of detail in New York dwellings is passing into a proverb. Nowhere in the world, probably, is so much time and money expended upon the furnishing and ornamenting of the homes of the rich as in this city. The draping of curtains has become a distinct branch of art, and every decorator and upholsterer has one or more employés whose sole business it is to arrange in graceful folds the draperies, which are now indispensable, at doors, windows and fireplace. Even the banisters must now be stuffed, tufted and draped on either side with heavy fringe. Ceilings are frescoed and painted in the studios of distinguished artists, and then transferred to the houses that they are to embellish. Hundreds of women are employed, at an expense of thousands of dollars, upon embroidery art needlework which are to adorn the sumptuous palaces in which our rich men live. Painting, statuary, carvings in stone and in wood, the richest fabrics of French and Indian looms, indeed, all that is rare and beautiful in nature and art, are brought to bear upon the decoration of these republican palaces. Even the stables in which the horses, coachmen and grooms are to be housed are far more luxurious than the simple homes in which the fathers of our race passed their lives. The newly-finished stables of Cornelius Vanderbilt, in Fifty-eighth street, far outshine those of the Roman Emperor whose sumptuous appointments have become a matter of history.—*Furniture Trade Journal.*

SAID a Pennsylvania political orator, warming up as he approached the climax of his speech, "Let us conduct this campaign, fellow-citizens, upon the principle enunciated by the immortal Lincoln, 'with malice toward all, with charity for none.'"

He was level full, and as he boarded a South Boston car he remarked: "Whazzer name that c'ductor tother car?" pointing vaguely at a departing vehicle. "Don't know," was the reply. "Well, he tole me gotakernap—aintergoint do it. I'm juss widerwakes he or any other man, and I don't want himmer nobody else tell me gotakernap 'n don't you firgizzit." He elucidated the subject for some time to the passengers, and then stepped off to hunt up that other conductor.

Locomotive Valve Gear.

In 1820, and later in the Killingworth engines, the valves were operated by a device similar to that shown in Fig. 1. On the main shaft *a*, an arm *b*, carrying a pin *g*, which slipped freely in the slot *f*, was fixed. As long as the engine traveled in one direction, the pin carried the eccentric *c* with it, and the opposite direction was attained by shifting the eccentric, which was loose on the shaft, until the pin *g* reached the opposite end of the slot *f*, when the engine would move in an opposite direction; *d d* being a rocker-arm, and *e* a rod transferring the motion to the valve.

In 1830 the gear shown in Fig. 2 was used by Bury. This also consisted of a loose eccentric stopped by lugs on the shaft, one lever being used to lift out of gear the eccentric rod, and another to handle the rocker-shaft. The loose eccentric, however, was not found to be satisfactory, and Carmichael soon after fastened two eccentrics to the shaft, one for each cylinder, as shown in Fig. 3. An eccentric rod having a double V-hook *a* was thrown into gear by means of the tumbling-shaft *b* and pin *c* the hooks gearing into the pins *d* and *e* on the rocker-shaft *f*. The lead was obtained by the angle of the rod, and definite proportions were necessary to make this gear equally effective in each motion.

The gear shown in Fig. 4 also had but two eccentrics, one for each cylinder. It consisted of two V-hooks attached to the single eccentric, which were thrown into or held out of gear by the two toes *a a* swinging from *b* and moved by the reach-rod; *c*, *d* and *e* being rocker-shafts, and *f* the valve stem.

In 1837 the Hawthorns, of Newcastle, first applied four eccentrics. This gear is shown in Fig. 5. The hooks geared in from the under side, and the tumbling-shaft extending clear across the engine, operated both sets of hooks simultaneously, the weight of one counterbalancing that of the other. Modifications of this new system followed each other, and differed only in the arrangment. In Fig. 5, *a* is the reach-rod operating the tumbling-shaft *b*, which, by means of the hanger *f*, operates one hook. The rod *c* attached to the tumbling-shaft *b* moved the auxiliary shaft *d*, which was coupled to the other hook by the hanger *e*. The shaft *j* extended across the frames, and a similar arrangment of levers, etc., operated the opposite gear; *k* being the valve stem, *l* the rocker-arm, *i* the crank and *h g* the eccentrics, which were of course set singly, each with the proper amount of advancement due to the lap and lead. It will be readily seen that in reversing the engine, the hook *m* was lowered and the hook *n* raised into gear with the stud *o* in the lower end of the rocker-arm *l*, thus totally disengaging the rocker-arm from the action of the hook *m*, which then swung free from everything and was sustained by the hanger *f*.

Fig. 6 shows another arrangement of the same principles, somewhat simplified as to the hangers, etc.; *a* being the rocker-shaft, *b* one hook, *c* the other, *d* the tumbling-shaft, *e* the hanger, *i* crank-pin, and *g h* eccentrics, the shaft *j* extending across and operating similar gear for the other side of the engine.

In Fig. 7 is shown what was probably the first attempt to do away with eccentrics by operating the valve from a pin on the main rod, by a Mr. Melling, of the Liverpool & Manchester Railroad. This consisted of a stud *c* fastened to the main rod *a a*, fitted with a block sliding in the slotted lever *h*; the stud *c*, following the dotted line *d d d*, transferring its motion to the valve through the short arm *i*, rod *e*, rocker shaft *f* and valve stem *g*, the point *i* traversing the small dotted circle. As the main rod in passing the centers traveled slowest, the movement of the valve was also slowest at that point, when it should have been the quickest. Mr. Melling obviated this, however, by operating the right-hand valve from the left-hand main rod, and *vice versa*, which change greatly improved the action. From this gear (of 1830) has grown several others of more or less similarity, the most prominent of which, at present, is Joy's.

Fig. 8 is Hawthorn's gear of 1838. Like the preceding, this also takes its motion from the main rod, and, of course, dispenses with eccentrics. The amount of lead is dependent on the inclination of the slotted piece *a*. In reversing the engine, the tumbling-shaft *c* was operated by the reach-rod *d*. Two arms, *i* and *j*, by means of the hangers *f* and *k*, changed the inclination of the piece *a*, and simultaneously ungeared the bottom hook from the stud *m*, and threw the upper hook into gear with the stud *n*, the rocker-arm *o* swung on the shaft *l*, and received its motion from the arm *p*, which was attached to the upper arm of the slotted piece at *r*. The pin *g* followed the dotted line *hh*, *b* being the valve-stem. As the motion was in no way superior to that of an eccentric, and the whole was somewhat complicated, it died a natural death.

Up to this time (1838), the slide valve in use on locomotives had little or no outside or inside lap, and consequently took steam on one end at the same time the exhaust opened on the opposite end of the cylinder. No attempt at using steam expansively had been made up to this year, when it was found that engines having considerable outside lead, and consequently with this valve the same amount of inside lead, thus allowing of an earlier opening of the exhaust, were burning less fuel and were smarter. The good effect of an early exhaust being clearly demonstrated, it was but a step to add outside lap, which was

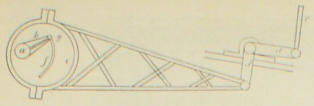


Fig. 1.

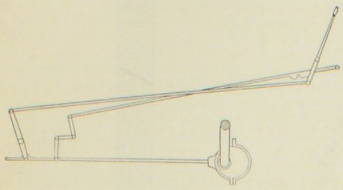


Fig. 2.

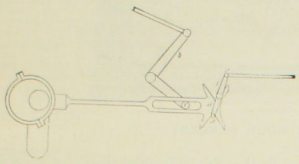


Fig. 3.

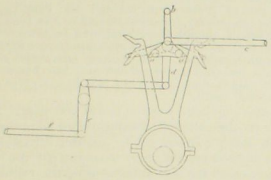


Fig. 4.

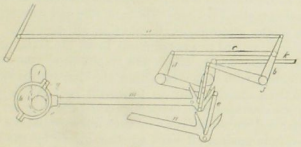


Fig. 5.

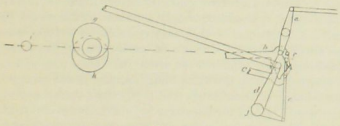


Fig. 6.

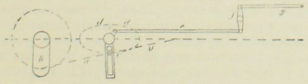


Fig. 7.

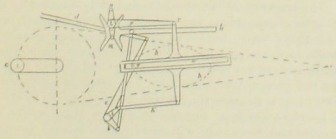


Fig. 8.

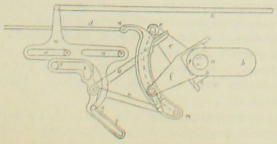


Fig. 9.

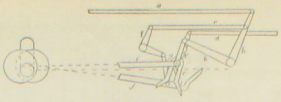


Fig. 10.

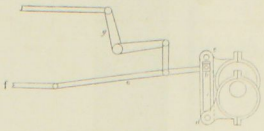


Fig. 11.

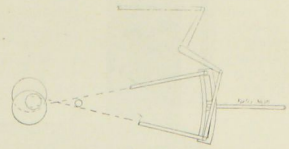


Fig. 12.

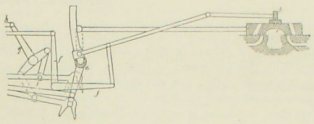


Fig. 13.

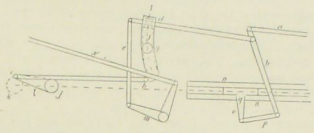


Fig. 14.

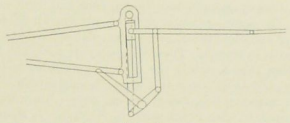


Fig. 15.

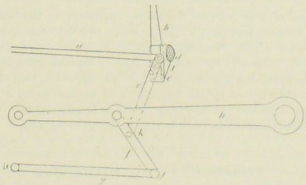
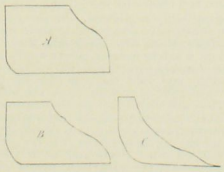


Fig. 16.



tried on the "Lightning" of the Liverpool & Manchester Railroad. This engine's valves were changed to ⅝ outside lap, and set with little or no outside lead. The effect of this was to reduce the fuel consumption 25 per cent. In 1840, engines were running with ¾ and 1-in. outside lap on English roads, and no expansion obtained save that due to the lap. The following table illustrates the importance of this addition of outside lap:

Consumption of coke per mile.			
49 lbs.	valve, 1-16 in.	outside lap, 1839	
36 "	" ⅝ "	" " "	
32 "	" ¾ "	" " "	
28 "	" 1 "	" " "	

In 1839 Gray's variable expansion gear was applied to a locomotive, and to Gray is due the honor of having first made the application of the principle of varying the travel of the main valve to produce expansion on any kind of steam engine.

Fig. 9 shows Gray's gear; *b* is the crank, *g* and *h* the centers of the two eccentrics *e* and *f*. The ends of the eccentric rods are fitted with blocks which slide when in gear in the slotted lever *L*, which is hung at *m*; *d* is the valve stem attached to the lever at *x*; *c* is the reach-rod which moves the frame *W*, which is supported on stationary pins *V V*, over which the frame *W* moves by virtue of the slots *U U*. In reversing the engine in the gear shown, the frame *W* is moved to the right, which movement by means of the pins *y* and *q* attached to the frame sliding in the slotted levers *t* and *p* hung at *S*, lever *o* being part of and fastened to *t*, and lever *n* being part of and fastened to *p*, depresses the lever or arm *o* and raises the lever *n*. This movement through the links *k* and *j*, which are attached to the end of the eccentric rods, lifts out of the curved slot in the lever *L* the rod *f* and pin or block *i*, and throws into this slot the block *e* on the end of eccentric rod *e*. The change in the travel of the valve and consequent expansion is produced by raising or lowering the pins *i* and *e* in the slot when either were in gear. The lever *L* being struck to the radius of the eccentric rods, the lead remains unchanged.

It will be noticed that as the frame *W* is moved to the right, the pin *y* produces no movement of the lever *t* and arm *o* until the pin reaches that portion of the slot in *t* where it dips downward, while the lever *p* is at once lifted. This condition is evidently necessary, as, if the eccentric-rod *e* commenced to lower simultaneously with the raising of the rod *f*, the result would be the locking of both pins or blocks *i* and *e* in the slotted lever *L*. It is also evident that as the pin or block *i* is raised in the slot of *L*, that the travel of the valve stem *d* is shortened, and hence expansion occurs. This invention of Gray's was a very important step in the right direction, as the principles involved are those which underlie the link motion as used to-day.

Fig 10 is another application of varied travel to obtain expansion, which appeared soon after Gray's. *C* is a rocker-arm having a slotted and forked addition to its lower arm; *i* is the goahead eccentric rod fitted with a pin *h* which is raised or lowered in the slot, or lowered entirely clear of the slot and fork by means of the tumbling-shaft *b b* and hanger *k*; *d* is the valve stem. It is evident that by lowering the pin *h* in the slot, the travel of the valve will be shortened, and *vice versa*, and hence expansion occurs. In reversing the engine, the pin *h* is thrown clear of the lower forked end of the rocker-shaft, which movement through rod *e*, rocker arm *f* and hanger *g* lifts into gear the lower hook *j*.

The first link motion is that shown in Fig. 11. The slotted link *a* is fastened to one eccentric strap at its top end at *c* and to the other at its bottom end at *d*. The reversing of the engine consisted of shifting the block *b* to the opposite end of the slot, which also carried the rod *e* attached to the valve stem *f* with it, *g* being the tumbling shaft. In 1843 a Mr. Howe produced the link motion shown in Fig. 12, which requires no explanation, as it is essentially the link motion of the present day. Stephenson first applied this to the locomotive.

Fig. 13 is an independent cut-off gear which a few years since was much used in the United States. This gear when correctly designed makes a much smarter and more effective engine than the ordinary link engine, as has been repeatedly demonstrated in practice.

It is essentially the gear, and involves the principles so extensively used in marine and stationary work where economy and effectiveness are necessary. It consists of a main valve *c* and a cut-off valve *b*. The main valve is operated by a rocker-arm and reversed by hooks *i* and *j*; *a* is sword-arm rocker-shaft, receiving motion from an eccentric rod *k*. Expansion is effected by altering the travel of the valve *b* by raising the block *x* on the sword-arm by means of the shaft *f f*. The cut-off rocker-arm and main valve rocker-arm are concentric, one being a sleeve working around the body of the other.

Fig. 14 shows the Walschaert gear, which dispenses with eccentrics, and has a limited application in the United States; *a* is the valve-stem, *b* a lever, which receives motion at its lower end by a link *p*, operated by an arm *o*, bolted to the crosshead *q*, *n* and *n* being the guides; *f* is a slotted link hung at *g*, which receives motion through a rod *h*, attached to a return crank *l* from the crank-pin *j*; *m* is a tumbling-shaft, by means of which the block *d* is shifted to any intermediate position, or to the other extremity of the link *f*. It gives results equal to the ordinary stationary link.

Fig. 15 is the Allen straight link, used extensively in England. In reversing the engine, the link and valve-stem are moved in opposite directions simultaneously, as one end of the tumbling-shaft arms is connected to the link and the other to the valve stem. It is claimed that this link gives superior results to that of the shifting link used in the United States, and that in well-designed Allen links the lead is unchanged.

The Joy gear, which is receiving some attention in this country, is an English invention, and is shown in Fig. 16. A rod *s*, fixed stationary by a pin at *i*, but which is free to turn on this pin, is attached to a rod *f* at *j*. The top end

of the rod is attached by a pin to the main rod *h*. Another rod *e* is coupled to the rod *f* at *k*. The upper end of the rod *e* is coupled to the valve stem *a* at *d*, and just below this point a second connection is made to a block at *l* sliding in a short curved piece *c*. The inclination of the block *c* determines the travel of the valve; *b* is the lever attached to the block *c*, which is operated by a reach-rod, etc.

This gear is claimed to be superior to the link motion on account of its simplicity, and it certainly gives a better distribution of the steam than the link motion, as will be seen by the cards A, B, C; and it would doubtless have as much wider application if it were not patented.

This gear will receive a closer analysis and description hereafter, as its merits, as compared with the link, make it worthy of attention. FRANK C. SMITH.

A Libel on Conductors.

A *Tribune* reporter met an old railroad conductor yesterday, and was surprised to hear that he had been discharged.

"Yes," he said, "the old man side-tracked me."

"What for?"

"Well, I suppose he thought I had too much money."

"Yours or his?" And he laughed.

"You remember I had begun working for the X. & Q. road in 1865, at the close of the war. From $50 a month I was gradually raised to $100. The other day the 'old man' (the Superintendent) found out that I owned and was paying taxes on $12,000 or $15,000 worth of property. So he kicked. He offered to keep me if I would 'restitute,' but I said I guessed I had railroaded about long enough."

"How did you save all that money in fifteen years from a salary of $600 increased gradually to $1,200 a year?" And he laughed again.

"As I'm out of the business now and kind of like railroad companies, I don't mind explaining the conundrum. I'll hold up my hand, though, and swear I always accounted for every passenger I ever carried. But I watered 'em—watered the company like as its directors water the stock. And I did it in this way: You see, every year the President and general officers issue an unlimited number of annual passes. Some of them are in exchange with other railroads, but most of them are to high-cock-a-lorums, Congressmen and members of the Legislature. I always made it my business when one of these fellows took my train to 'pipe him off'—that is, get in conversation with him, find out where he lived, and what his business was. You know, passengers always like civil treatment from a conductor; it seems odd like. With this acquaintance I used him."

"Used him?"

"Yes, used him. Knowing about how often his business required him to travel, I traveled for him. Do you catch on? When he didn't travel, I just deducted that much from my cash receipts and credited the annual bummer with one trip. My division cash fare was a little less than $7, and it was a poor run for me if I didn't turn in two or three old duffers."

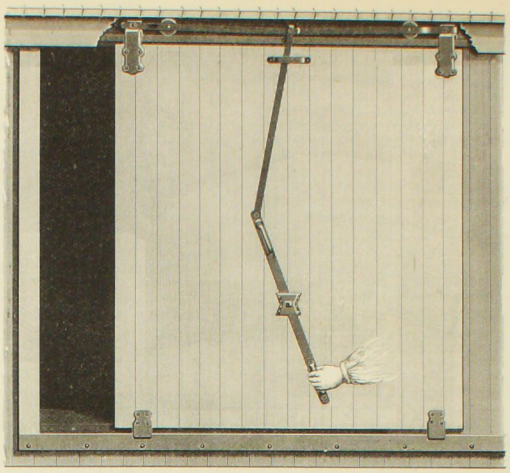
"Ah, I see. You robbed Peter to pay Paul?"

"No, I robbed the annual passholder to pay myself. But my best holt was in catching the passholder who wanted to rob the company. There's where I made the most of my money. You see, the average member of the Legislature not only thinks the company should carry him free, but all his friends. So he loans his pass to Tom, Dick and Harry, his neighbors. I made it my business to identify every legislative passholder. Every two or three weeks a man would get on my train and show up that pass. I would give him his check, go on through the train, do my work and then come back and sit down by him. I would say, 'Let me look at your pass again?' He would hand it out. I would then turn to my memorandum book and read: 'Archimedes Skrubendike, tall, dark hair, 30 years old; annual, O197.' Then I would turn to the rooster and say, 'Why, you're not Archimedes Skrubendike; you've no right to ride on this pass. Read the conditions on this—Not transferable.' And then the fellow would go all to pieces. He would beg, and plead, and offer fare, but I was too fly. When I had him bad enough scared, I would say: 'I'm sorry, and I hope this thing will never occur again. Now, I'll tell you what I'll do. I'll not take up this pass, as I'm instructed to do, for Skrubendike is a good friend of the railroads, and I wouldn't have him get into trouble for anything in the world. You give me $10, and I will let you keep the pass to give back to him, only you must promise never to tell him you got caught.' And the fellow would snatch out $10 quicker'n wind. It's an honest fact, in one year I worked one old Skrubendike for more'n $300. The old duffer even loaned his pass to women."

"Anything else?"

"Well, if these two rackets don't account for what I've got it's no use buzzing to a blankety blank newspaper fool."—*Chicago Tribune.*

A MAN who had been punishing his wife by shutting her up in a room sent his little boy to her from the breakfast table with the command, "Tell your mother here is a bone your father sends for her to pick;" to which she replied, "Take it back and tell him he isn't your father, and that's a bone for him to pick!"



MOORE'S FREIGHT CAR DOOR HANGER.

THE engraving represents a new freight car door hanger, the merits of which will be appreciated by railroad men. With the exception of wheels, handles and stop-plate, it is made entirely of wrought-iron. When at rest, the door is suspended entirely by the hanger straps, the wheels then not being in service. Moving the handles in either direction depresses the wheel levers, which force the wheels down, and then, using the levers as fulcrums, lift the hanger straps off the rail, thus allowing the wheels bearing the door to move freely along the rail. The moment the handle is released, the door settles back to place. This result follows from using either the upper or lower handle. The same force that is used to lift the door serves to move it in the required direction after it is on the wheels. A pressure of about ten pounds applied to either handle will accomplish this.

Upon many roads freight car doors are not hung on wheels, on account of their liability to slam from end to end by the jerking of the cars when the doors are left open, thus dragging a dead weight back and forth on the rail. The doors are better with wheels when it is desired to open and close them, and better without wheels when the car is in transit. These requisites are provided for in the plan shown, while the door is hung so securely that it can not be lost, even if the car is overturned. Doors can be made on this plan at any car shop. They are manufactured by the proprietors, S. H. & E. Y. Moore, 163 Lake street, Chicago.

ONE of the hardest woods in existence is that of the desert ironwood tree, which grows in the dry washes along the line of the Southern Pacific Railroad. Its specific gravity is nearly the same as that of lignum vitæ, and it has a black heart so hard, when well seasoned, that it will turn the edge of an axe and can scarcely be cut by a well-tempered saw. In burning it gives out an intense heat, and charcoal made from it is of unequaled quality.

Protection to Freight-Train Men.

The Hartford (Conn.) *Courant*, in speaking of the great number of accidents which occur in the handling of freight trains, and especially in coupling cars, says:

"The responsibility is divided. In the first place the railroad companies have asserted that there was no safety coupler available; then they have said that if one road were to adopt a safety coupler others would not, and so, as trains are of mixed cars, the action of one road would be of no avail; and then there is also the excuse that many cars (thousands on thousands) do not belong to any railroad. They are only leased from companies that own them, and these cars the roads cannot make or regulate. The car company people shirk the responsibility upon the railroads and the railroads return it to the car companies or else unload on other roads, and, while they are thus mutually unloading, the brakemen, nearly always poor young men with young families, are being cut up at the rate of ten thousand a year.

"Now the railroad commissioners of this State, and we believe of Massachusetts, have declared officially, after investigation, that there is such a thing as a cheap, available safety coupler. The question now is how to enforce its adoption. Various devices have been suggested. To require that it be put on at once would be to demand too much. The most sensible scheme that has yet been advanced is, that a law be passed requiring that after, say, two years, no car shall be allowed to run over a road in this State which has not on it safety apparatus approved by the railroad commissioners.

"It is an open fact among New England railroad men that a vast expense, many accidents, and great trouble can be traced to poor cars sent here from the West, and much of this trouble is due to poor couplers and drawbars. There is economy as well as consideration for human beings involved in legislation that will do away with this state of things. Putting the limit at two years gives ample time for the gradual working over of cars to new and better models, and is at least fair towards the companies. As it involves the demolition of young men for two years more at the rate of 10,000 a year through the country before reform is compulsory, it cannot be said to lean too strongly in their behalf, though there is nothing to prevent earlier changes; and, as no particular apparatus is named, favoritism cannot be alleged. Let railroad companies and car companies feel that they *must* attend to this business, and it would soon be done, and when it is done a great saving of blood will result."

[The above invites a word or two of comment. Assuming that the difficulty of selecting one or more cheap and available safety-couplers can be got over, the still more difficult problem remains, how to compel the use of such appliances on all the cars running over the railway lines in a particular State. In a matter of this kind, in order to reach practical results, the railroad system of the country must be regarded as a whole. The requirements of transportation make it necessary for cars, like the varying currents of the atmosphere, to move in all directions with little or no regard to geographical lines. It is the easiest thing in the world to pass a law prohibiting the owners and managers of railroads within the narrow limits of a State from allowing cars to pass over such roads unless they are provided with certain specified coupling arrangements; and we do not see why such a law would not operate equally against all cars, whether owned by the roads or not, simply by holding the roads within the State responsible for the running of such cars on their tracks. In case an interval of two years is allowed before the law takes effect, it would be simply a notice served on all the railroad companies of the country, and all freight lines, car trusts and other owners of cars, that unless certain appliances are attached to such cars they will not be permitted to cross the State line. In view of the enormous interchange of freight cars that now exists, such a prohibition would be bad for the roads within the State and for its business interests generally, unless the law was everywhere complied with, outside of the State as well as within it. As respects cars that are not in good running order, it is not for the interest of any road to receive those that will not pass fair inspection. We are heartily in favor of any legislation that will make the handling of cars easier and safer, and so far from discouraging this particular movement in that direction, we hope it will be consummated at an early day in order to test its efficacy—ED. CAR-BUILDER.]

THE strength of many woods is nearly doubled by the process of seasoning; hence timber used in its green state is not only weak, but is exposed to continual change of bulk, form and stability. Wood will always warp after a fresh surface has been composed, and will change its form by the presence of moisture. The effect of moisture on dry wood is to cause the tubular fibers to swell; hence, if a board be wet upon one side the fibers there will be distended and the board will bend. The natural law that governs the shrinking or contracting of timber is most important to practical men, but it is too often overlooked. The amount of the shrinkage of timber in length when seasoning is so inconsiderable that it may in practice be disregarded, but the shrinkage in transverse directions is much greater, and presents some peculiarities which can only be explained by regarding the structure of the wood as resulting from its mode of growth.—*Northwestern Lumberman.*

A SUBSCRIBER connected with the lumber department of a western car company wishes an answer to the following question: To what dimensions will a piece of green white oak, 3 inches by 12, shrink in drying?

NATIONAL CAR BUILDER

PUBLISHED MONTHLY

BY

R. M. VAN ARSDALE.

5 DEY STREET.....NEW YORK.

JAMES GILLET, Editor.

L. E. WATERMAN, CORRESPONDING EDITOR.

MARCH, 1882.

EDITORIAL ANNOUNCEMENTS.

Addresses.—*Business letters should be addressed, and drafts and money orders made payable, to* THE NATIONAL CAR-BUILDER. *Communications for the attention of the Editor should be addressed* EDITOR NATIONAL CAR-BUILDER.

Advertisements.—*Nothing will be inserted in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *The editorial department will contain our own views and opinions; and the rest of the reading matter, aside from advertisements, will be such as we consider of interest to our readers.*

Contributions.—*Articles relating to railway rolling stock construction and management, and kindred topics, by those who are practically acquainted with these subjects, are especially desired. Also early notice of changes in railroad officers, organizations and names of companies.*

Special Notice.—*As the* CAR-BUILDER *is printed and ready for mailing on the last day of the month, advertisements, correspondence, etc., intended for insertion, must be received not later than the 25th day of the month.*

CONTENTS.

	Page.
ILLUSTRATIONS:	
Salmon's Hot Water Heater for Railway Cars	26
Standard Passenger Locomotive—Chicago & Alton Railroad	28
Locomotive Tender and Tank—Chicago & Alton Railroad	32
Wilson Slide Valve	31
Locomotive Valve Gear	32
Moore's Freight Car Door-Hanger	34
COMMUNICATIONS:	
Locomotive Boiler Joints	30
Railways and the Timber Supply	31
EDITORIALS:	
The Westinghouse Brake	35
Railway Free Passes	35
Responsibility and Punishment	35
MISCELLANEOUS:	
Car-Builders' Monthly Meeting—Freight Train Brakes and Brake Shoes	27
A Courageous Engineer	20
A Novel Railway	27
Recent Reports of Railway Rolling Stock	29
Detailed Cost of Standard Road Engine—C. & A. R. R	30
The First Pullman Cars	31
Luxury in New York	32
A Libel on Conductors	34
Protection to Freight Train Men	34
Taste in Car Decoration	36

SUBSCRIPTIONS *to the* CAR-BUILDER *will be received, and copies kept for sale, at the following places:*

A. WILLIAMS & CO., 283 *Washington St., Boston, Mass.*

L. SCHAFFNER, *Cigar and News Dealer, Grand Pacific Hotel, Chicago, Ill.*

WILLIE H. GRAY, 306 *Olive Street, St. Louis, Mo.*

ROBERT CLARKE & CO., 65 *West Fourth Street, Cincinnati, Ohio.*

NEW subscriptions to CAR-BUILDER from 1st to 25th February, 580.

OUR readers are earnestly requested to give us prompt information of changes in the classes of railroad officers comprised in our directory of roads, and also of errors and omissions in the list as published. The only value of such a list is in having it correct, or approximately so; and this is quite out of the question unless a large number of corrections are made every month. These, of course, we cannot make without the necessary information, and this we cannot get by any infallible magical process. The rapid extension of railroads, together with the leasings, consolidations and changes in organization cause a continual change in the lists of officers. Aside from this, many positions, especially in the mechanical department, are vacated and filled in a quiet way of which we can know nothing, unless the parties themselves take the trouble to inform us. We desire to make our list practically useful, and in order that we may do so we are compelled to rely largely upon the aid and co-operation of our readers, who can render us the greatest service in a multitude of cases at the trifling cost of a postal card and two minutes' time.

AN anti-monopoly agitator, who is a member of the New York Senate, has introduced into that body a bill for the appointment of a State railroad commission, and to remedy railroad abuses. Its absurdities are so apparent as to make it quite clear that the author has no idea of its becoming a law, but is merely bent on manufacturing a little buncombe for his own private advantage, as the representative of the great Thurber oleomargarine interest in cheap grocery transportation. The bill rings the changes on the old gong, by providing that any railroad company that shall make "unjust discriminations," or receive more than "fair and reasonable rates" for carrying passengers and freight, shall be deemed guilty of the "crime of extortion" and be punished as therein provided. The commissioners are to make rates based on "cost of service," and ten per cent. above this is to be the maximum. The companies must furnish the commissioners with statements so they can determine what the cost of service is in order to fix the rates, and refusal to do so is made a misdemeanor. In order that the virtue of the commissioners may not be recklessly tampered with, they are prohibited from accepting free passes or gifts. Freight tariffs are to be uniform; there are to be no evasions, tomfoolery or underhand operations of any kind. Every thing is to be done on the square—Jack Cade fashion. Even should the bill become a law just as it is, it would forever be inoperative in the matter of passengers and freight, for the reason that such rates must be based on cost of service, and no living man can figure out to a technical nicety so as to strictly conform to legal requirement what the cost of service actually is.

THE WESTINGHOUSE BRAKE.

The question is being discussed in railway and other journals as to whether the unexpected stopping of the unfortunate express train at Spuyten Duyvil was not owing to a defect in the Westinghouse brake. It seems to be admitted that the brakes were "set" on one of the cars without the knowledge of the engineer, thus bringing the train to a standstill at a time and place extremely hazardous. The point to be determined is whether the setting was due to the defective working of the automatic attachment or to a reckless tampering with the brake-cord by some person in the car. Unfortunately there is thus far no conclusive evidence by which the question can be settled, and the real state of the case must be left to conjecture. If the apparatus in its ordinary working is liable to such freaks, the Westinghouse Company is as much interested as the general public in getting at the facts, in order to apply a remedy. The reputation of the brake and the safety of passengers are equally involved.

The Westinghouse brake, in its original and in its improved form, is not a new thing. It has long since ceased to be an experiment. Its primary purpose was to insure greater safety in the movement of trains, and its efficiency in this respect has been confirmed by its almost universal adoption. Every improvement that has been made to it has been the form of some new safeguard against danger, the safety-cord automatic attachment especially. We do not believe the cord will be dispensed with at the suggestion of a coroner's jury, nor will the principle of the brake itself be condemned because the apparatus did not prevent a catastrophe in the face of a variety of untoward circumstances. It is possible at times for the best of agencies to work mischief, but sensible people will discriminate between exception and rule, especially when the evidence is conflicting and inconclusive. There is one thing in connection with this brake which can never be known, and that is the amount of protection it has afforded to life and property, measured by losses and casualties which might and probably would have occurred in the absence of such a device. The presumption, however, is decidedly in favor of the brake.

If the automatic attachment is liable to set itself, or cause the brakes to "creep on," as it is termed, let the fact be ascertained and remedied. Since the accident at Spuyten Duyvil, many instances of this defect have been cited as having occurred previously, but they do not seem to have given rise to any serious apprehension. An appliance which enables one man to control at his will the movement of a passenger train is necessarily complicated; but if it is at the same time effective, it is in the last degree important that the person who operates such an appliance should be thoroughly familiar, not only with every detail of its construction, but with the philosophy of the thing, so as to be able to account for every why and wherefore of its action or failure to act. We apprehend that the education of very many locomotive drivers falls short of this requirement. Their positions are, as a rule, won too quickly. There is too much hop, skip and jump about it. They understand how to operate air brakes, so far as following certain directions is concerned, and all goes well so long as the normal action is maintained; but when there is irregularity and disorder, the wheels of a car suddenly held fast without apparent cause, bringing the train to a stop, it is then that the knowledge of many locomotive engineers falls short of the requirements of the responsible positions they occupy.

RAILWAY FREE PASSES.

The anti-monopoly reformers are very profuse in their suggestions as to the proper management of railroads. They would not only relieve the community at large from the burden of oppressive rates and fares, but also the innocent stockholders as well, whose dividends are cut down by the corrupt and wasteful expenditures upheld and sanctioned by directors and managers. One of the most obnoxious of the many aggressions complained of by the "league" is the issuing of free passes, a device which is characterized in one of its printed slips recently sent out, as one of the worst ever invented by the common enemy of mankind. It is not only said to be bad for the railroads and the public, but it reduces legislative work in the State of New York to four days per week, besides corrupting the morals of members and causing them to shirk their duties. This reflection on the morals of our oath-bound, law-making Solons is pretty severe, but reformers as a class are not apt to be mealy-mouthed in dealing with iniquity.

It would probably be better for all concerned if no persons, except railroad officers, were permitted to ride a single mile in a railroad car without paying regular fare. The proportion of deadhead traveling has been estimated as high as ten per cent. of the aggregate. Every free pass passenger is so much dead weight, taxing the motive power and costing the roads that much more to haul the paying passengers. Worse than this, even. Deadheads are almost invariably fat, heavy, overgrown, 200-pound fellows, while the paying people are most of them light weights. The former are apt to put on airs and look down on their less fortunate fellow-travelers as being a trifle inferior in personal consequence and smartness. Their moral sensibilities are so obtuse that the idea of any possible similitude between free passes and nasty bribes never occurs to them, as it surely ought to, especially if they are legislative or judicial officers. The offer and acceptance of passes in such cases is looked upon as an exchange of courtesies; but it also implies a reciprocal sense of favors received or expected, and the same may be said in cases where passes are solicited. We are free to admit that the whole thing needs reforming, but the world cannot be reformed in a week—a matter which the so-called anti-monopolists seem to have overlooked. Abuses can not be legislated out of existence in advance of public sentiment. This is fairly exemplified in the recent movement against free passes in the Iowa Legislature. The resolution on the subject was referred to the State Railway Commissioners, who made a report which virtually sustains the system, by representing that laws that have been passed for its prohibition in other States have proved a dead letter.

With respect to this particular abuse, we would suggest to the leaguers, who are so zealously bent on reform, the propriety of calling a general indignation meeting of railway stockholders to take the matter in hand. The issue can be made a controlling one at the annual meetings for choosing directors, and the whole thing wiped out without legislative interference. But if the stockholders refuse to be indignant, and are content to be robbed, there is an end of it. The anti-monopolists can hardly expect to carry their point by flooding the land with clap-trap circulars. Before they can extirpate this or any other abuse in railway practice, they must first reform themselves by correcting their methods of argumentation and by giving to their crusade a less transparently political character.

RESPONSIBILITY AND PUNISHMENT.

The Spuyten Duyvil accident, from all that can be ascertained as to its causes, was a preventable one; but, unfortunately, the means of prevention were not effectively made use of. In this there was culpable negligence, for which somebody is justly responsible. But how to apportion that responsibility so that each and every individual connected with the complex organization of a great railroad shall receive no more nor less than his just and proper share is a knotty problem. The same kind of negligence, if it may be so called, or failure to make timely use of certain precautions that would have infallibly prevented this particular accident, existed then, and undoubtedly exists now, upon numerous other roads. But the same happenings or conjunctures of circumstances have not occurred on such roads, so as to bring the neglect into vivid contrast with resulting calamity. The popular sentiment is by no means blind to this consideration; but something must be done to put a stop to these things, and, accordingly, some one, two or three unfortunate men, in no respect more blameworthy than hundreds of others, are singled out as an expiatory sacrifice, or rather as a warning to every body having anything to do with the running of trains or the working of switches and signals. Such examples are supposed to make the others so alert in the performance of their duties that no imputation of negligence can justly be brought against them. It is assumed that no railroad man of the classes mentioned has any more right to err in judgment, to be sleepy, tired or forgetful, than a soldier on picket duty in war; and if any of these weaknesses get the better of him to the detriment of other people, he is to be accounted a criminal and subjected to exemplary punishment. It would seem more like even-handed justice if *all* such delinquents could be punished, whether the result of their delinquency was the killing or maiming of other people or not. But as punishment can not well be meted out impartially in this way, there is probably no other mode for enforcing fidelity and discipline and protecting the public, than to punish vicariously the exceptional few who happen to be the direct cause of accidents involving personal injuries.

A rigorous code of this kind vigorously administered would no doubt prevent many accidents that would otherwise occur. It would at least inspire a dread of consequences; but it may be questioned whether it would make train, switch, and signal men more intelligent, or willing to do more work for the same pay. Nor would it have the effect of driving the present class of employés from the service to make room for others of a higher range of intelligence at higher pay. Least of all would it bring about a state of things in which automatic mechanical appliances would take the place of eyes, brains and muscles. Human intelligence must be largely relied on, however perfect may be the mechanical safeguards. The ultimate solution of the problem will doubtless be found in the employment of more men and better men, and these can not

be had for wages that are readily accepted by the great mass of unskilled laborers who bring to the service mere physical stamina, irrespective of intelligence and honesty.

WE are glad to announce that the *Scientific American*, instead of being crippled by the Potter Building fire, emerges from it with renewed life and vigor. The subscription and account books, patent records and drawings, and other valuable papers, were preserved in fire-proof safes. The *Supplement* was printed in another building, and consequently there was no loss of materials used in its publication. Messrs. Munn & Co., the proprietors of both publications, were so fortunate as to obtain a new and most desirable location within a few hours, at 261 Broadway, corner of Warren street, and fronting the City Hall Park. The numerous readers of these popular and widely circulated journals will be glad to learn that the fire has caused no interruption to their regular issues.

The Industrial Review is the name of a new monthly journal published at Atlanta, Ga., and Philadelphia, Pa. It proposes to deal with all the great questions of mechanical and scientific progress, with special reference to Southern interests, and the redemption of that section of the country from the "languishing pulses of free trade." The field is an inviting one for this class of journalism, and none the less so from the fact that as yet there is little competition to contend with. The initial number contains 42 three-column pages of well-printed reading matter, embracing a variety of industrial topics, and interspersed with numerous illustrations. Price, $2 a year. Address, 806 Walnut street, Philadelphia.

Oil and Drug News.—This is a weekly paper published in the interest of the oil, paint, drug and kindred trades, by Root & Tinker, 102 Nassau street, New York. It contains prices current, review of the markets, weekly imports and exports, business changes, patents granted pertaining to these trades, and a full line of advertising. The *News* is now in its third volume, and is a reliable publication in respect to the specialties named. Price, $3 a year, or $3.50 if sent out of the United States.

The Furniture Trade Journal, heretofore published in Chicago, has been removed to New York. It is issued semi-monthly, and contains 22 three-column pages of reading matter in clear and legible type, embodying a mass of information that is extremely interesting, not only to the trade, but to householders and others who desire to keep posted in regard to the newest designs in furniture, upholstery, carpets and other details of house decoration. The editorial, selected and illustrated articles evince a thorough acquaintance with the subjects discussed, and a practical knowledge of the wants of manufacturers, dealers and consumers. Each issue contains prices current of the trade, and the latest business changes. As a medium for advertising, its extensive list of patrons in this line is an evidence of its wide and growing appreciation. We extend a cordial greeting to our contemporary and bespeak for it the success it deserves. Thomas S. Grimwood, proprietor; E. Beach Curtis, editor. Office, 51 Chambers street; price, $5 a year.

A PARAGRAPH, copied from an exchange, appeared in our January number, to the effect that Mr. Frank Bradley had been appointed superintendent of the shops of the Pullman Car Co., at Detroit. This, we are informed, is an error. The position of "Manager" is held by Mr. H. L. Spaulding, who received the appointment soon after the resignation of Mr. T. A. Bissel. The company's shops at Detroit have no superintendent.

SOME wiseacre says that the safest place in a train of more than two cars is probably near the center of the last car but one. We don't believe it. We have traveled more then forty miles a year on railroads for tne last thirty-five years, always taking whichever car came the handiest; and the only injury we received in that long run was a distressing cold, caught on a wintry day while sitting in the middle seat of that identical last car but one. The stupid brakeman was trying to burn sappy wood in a stove that wouldn't draw worth a cent.

Taste in Car Decoration.

"Traveling in a 'Pullman' the other day," says the *Furniture Gazette*, "we noted, as we have often done before, the gaudy and inartistic character of the decorations now so generally used to ornament the wood ceilings of passenger cars. In the building of these luxurious rolling palaces the question of expense is not considered, and the wonder, therefore, is why good decoration is not used instead of poor. As a fact, much of the decoration would be both improved and cheapened by simplification, and with the saving thus effected the company might afford the services of an artist with an eye for color, and thus spare that small portion of the public that cares for such things the sight of such tasteless attempts at art. It is but fair to state, however, that not all car decoration is open to reproach. The cars built by the Pullman Company for the New York Elevated road, finished in mahogany and oak, are charmingly and tastefully decorated in color, which is used sparingly and with an artistic feeling. If the cabinet maker had not been so profuse with his moldings and panels the result would have been still better. While on the subject of car furnishing, we will quote the opinion of a well-known English critic upon the recently introduced American novelty: 'The inside of the cars, comfort apart, is most distressing, especially in regard to the coloring. A brick-red carpet, with a wiry yellow scroll running throughout; the chair upon this, upholstered with strong crimson velvet; the covered ceiling covered with oak *paper*, upon which is printed what may be described as "some silver bells and cockle shells and cowslips all in a row." This "all too but" attempt at English is abandoned in the ceiling proper, for there we are treated to bunches of luxuriant roses. It was a worthy idea on the part of the decorator to take up the mission attributed by Schiller to women, and "wreath the dull earth with the roses of heaven," but the blossoms in question are much too celestial in color. The same description applies to the figures on the ground-glass doors, supposed to represent painting and sculpture. It is well that Flaxman departed ere the advent of Pullman, for such figures would have driven our talented modeler to suicide. Surely some one of our leading art furnishers or decorators could have been consulted in these matters, and such anomalies avoided. It is a pity that eyes suffering from artistic sensitiveness should be annoyed with such obvious breaches of good taste. The American woodwork inside of the cars is more satisfactory, but even that suffers from an overdose of gilded decoration. It is in the style which characterizes nearly all recent American furniture, and may be described as Yankee-Greek. Used in moderation, it is not a bad modern interpretation of the Grecian lines, but thrown about, as it is in the present instance, it becomes offensive in the extreme. The panel and pilaster annexed are favorable bits from the car, and will show the manner of treatment. The panel is produced in marquetry work, and some half a dozen colors are employed in the design. The cutting is well done, but some of the colors, especially the green, are too violent. The enrichment of the pilaster is incised and gilded, as also the rest of the woodwork. In some of the spaces formed by these lines patches of Italian walnut are stuck on in that peculiar manner presumably admired in the States.'"

THE New York, Pennsylvania & Ohio has closed a contract with Messrs. Clark, Post & Martin, of New York, for the lease of 2,700 cars for freight traffic. The cars are of the latest improved patterns, being made at the Terre Haute Car Works, St. Louis Car and Foundry Company, Ohio Falls Car Works and Tiffin Car and Iron Works. The standard value of the box cars in contract is estimated at $800 each, $200 above the ordinary appraised value for that kind of rolling stock, the stock and other cars are estimated proportionately. According to the agreement, the New York, Pennsylvania & Ohio Company agreed to pay to Clark, Post & Martin, $1,822,422.84 in eighty-four consecutive monthly payments of $21,695.31. This is one of the largest rental contracts ever made by any corporation, exceeding in number the one between the United States Rolling Stock Company and the Wabash, St. Louis & Pacific, some 800 cars.—*Elevated Railway Journal.*

THE Richmond, Fredericksburg & Potomac road has built all its cars of every kind for the last ten years. It has built since Jan., 1881, 3 passenger, 20 box, and 10 flat cars for itself, and 8 cabooses for the Richmond & Allegheny road. They are now working upon 20 box and 5 flat cars of 40,000 pounds capacity. The road uses the M. C. B. standard axle and journal box. The three passenger cars built last year were for excursion traffic, and have an inside finish with square panels and beveled edges to the rails, etc., and without moldings. This makes a plain and neat finish for a summer car. The ceiling is of $1\frac{3}{4}$-in. strips, with beveled edges. The whole inside of the car is finished with two coats of varnish. The window sill caps and seat frames are black walnut, and the rattan seats and seat backs were made by the Hale & Kilburn Mfg. Co. of Philadelphia. They have Creamer's end ventilators and no end windows. The recess for the water-cooler in the corner of the closet opens into the car and is entirely cut off from the closet. The cooler is detached, and can be removed from the recess at pleasure. These cars are 56 ft. 4 in. over platforms; the bodies are 51 ft. $2\frac{3}{4}$ in. long, and 9 ft. $10\frac{1}{2}$ in. wide; the width inside is 8 ft. 10 in. They weigh 42,500 pounds, and cost $4,250 each. One of their cars built in 1875 has run over 300,000 miles, and has never had any repairs on its body. Its wood work is all sound, and it has lost none of the $\frac{3}{4}$-in. camber in the sills. It is now in the shop for its first repainting and a new head lining. These shops now employ 115 men.

SHIPMAN & BOLEN, of Newark, N. J., are making extensive shipments of Railway Varnishes to prominent Western and Southern roads.

THE Empire Forge Co., of Cohoes, N. Y., have issued new price lists and discounts for their forges and blowers, annuling all previous ones. The company also announce a new stationary blacksmith's forge, but which can be moved from place to place like any other tool.

THE San Francisco sea-captain who traded the ship's Bible for thirteen plugs of tobacco is spoken of very severely by the religious press of that city.

A WESTERN editor received a letter from a subscriber asking him to publish a cure for appletree worms. He replied that he could not suggest a cure until he knew what ailed the worms.

Two Irishmen traveling on the Baltimore & Ohio railroad came to a mile post, when one of them said, "Tread aisy Pat; here lies a man who was 108 years old. His name was Miles —— from Baltimore.

AN Irishman, who had just landed, said, "The first bit of mate he ever ate in this country was a roasted potato—boiled yesterday. And if ye don't believe me, I can show it to ye, for I have it in my pocket."

THE feat of picking cotton in the morning and having a suit of clothes made of it by night has been surpassed. "The corn was shelled in the morning," said an exhibitor at Atlanta, "and the man was drunk before dark."

A CELEBRATED lawyer said that the three most troublesome clients he ever had were a young lady who wanted to be married, a married woman who wanted a divorce, and an old maid who didn't know what she wanted.

"Say, conductor, why don't this train go on?" inquired a red-haired passenger, with his head out of the car window. "Put your head in," replied the conductor. "How can you expect it to go on when the danger signal is out?"

Our Directory.

We note the following changes since our last issue. Readers are requested to give us prompt notice of changes when they occur:

Baltimore & Ohio.—N. E. Chapman, for many years Master Mechanic of the Cleveland & Pittsburg, and formerly President of the Master Mechanics' Association, is to be Master of Machinery of this road.

Central, of New Jersey.—Joseph S. Harris has resigned the office of General Manager. James F. Randolph is appointed Superintendent of the Long Branch Division.

Cincinnati, Green River & Nashville.—A. C. Sim has been appointed Superintendent, vice George B. Harper.

Chicago, St. Louis & New Orleans.—C M. Sheafe has been appointed General Superintendent (a new office) with headquarters in New Orleans.

Cleveland, Akron & Columbus.—J. W. Holloway has resigned the position of Master Mechanic on account of ill health.

Cleveland & Pittsburg.—N. E. Chapman, who has for many years filled the position of Master Mechanic, has resigned to become Master of Machinery of the Baltimore & Ohio.

Kansas Central.—Wm. T. Kelly has been appointed Superintendent, with office in Leavenworth, Kan. He has been on the Union Pacific for a long time.

Northern Pacific.—John H. Ames has been transferred from New York to St. Paul, Minn., as General Purchasing Agent. J. F. Curtis has been appointed Master Mechanic of the Fend d'Oreille Division. He was formerly Master Mechanic of the Pacific Division and lately of the Oregon Railway and Navigation Company.

Peninsula.—The name of this road has been changed to New York & Norfolk.

Peoria, Decatur & Evansville.—G. R. Cobleigh has resigned the position of Superintendent.

Pittsburg & Western.—The office of Superintendent is abolished, the late incumbent, Mr. W. J. Bonner, having engaged in private business.

Potomac, Fredericksburg & Piedmont.—W. M. Crafton, previously Assistant Superintendent, has been appointed Superintendent.

Richmond & Danville.—R. H. Duesberry has resigned as Purchasing Agent, to connect himself with the supply-house of Geo. A. Smith, late Smith & Rady, of Richmond. This house has the Southern Agency of the Midvale Steel Works. Tho. W. Gentry has been appointed Master Mechanic of the principal shops at Manchester. He has been in the service of the road since early boyhood. W. R. Riddick is Acting Purchasing Agent.

Richmond & Petersburg.—T. D. Kline has resigned as Superintendent, and will engage in other business, and Wm. Royal has been appointed as his successor.

St. Louis, Keokuk & Northwestern.—John W. Smith has been appointed General Superintendent, vice H. B. Blood, who is appointed Auditor.

St. Lawrence & Ottawa.—Archer Baker has been appointed General Superintendent.

St. Paul, Minneapolis & Manitoba.—Harvey Middleton has been appointed Master Mechanic, vice A. A. Ackerly, resigned, and will have full charge of the locomotive and car departments.

Shenandoah Valley.—W. C. De Armond has been appointed Purchasing Agent, with office at Philadelphia, Pa. Charles Blackwell is Superintendent of Motive Power, and holds same position on Norfolk & Western.

Texas & St. Louis.—J. W. Brown has resigned his position of General Superintendent.

Wabash, St. Louis & Pacific.—Jacob Johann is appointed General Master Mechanic of the entire line; office at Springfield, Ill. U. H. Kohler is General Master Car-Builder of the entire line; office at Toledo, O.

Employment.

Advertisements will be inserted under this heading for one dollar for each insertion.

WANTED.—A position as Foreman Painter in a railroad shop. Have had seven years' experience, and charge of a shop six years. The best references given. Address NATIONAL CAR-BUILDER, 5 Dey street, New York. 2t

FORGINGS.—A practical man having some capital to invest would like to hear from parties who are desirous of establishing the forging business. Address, stating location, chances for business, and inducements that can be offered, W. H. N. & Co., office of NATIONAL CAR-BUILDER, 5 Dey street, New York. 3t

CONTINUOUS DRAW-BAR PATENTS.

The following circular has been issued by the Secretary of the Western Railroad Association:

CHICAGO, Sept. 9, 1880.

To the Members of the Association:

GENTLEMEN:—Claims have been pending for several years that the Continuous Draw-Bar, sold by the Continuous Draw-Bar Company under the Middleton and the Griffith and Patterson patents, is an infringement of patent 71,580, granted 3d December, 1867 (re-issue No. 8,060, granted 19th February, 1878), to Edward L. Caum.

This Association has continuously advised against entertaining this claim, but to quiet all questions, and at our instigation, the Continuous Draw-Bar Company has recently purchased the Caum patent, its owner inserting in the assignment a full and absolute release to all the members of the Eastern and Western Railroad Associations from any and all liability for, or on account of, any infringement heretofore of said patent.

Yours truly,

J. H. RAYMOND, Secretary, etc.

CLARENCE BROOKS & CO.

MANUFACTURERS OF

RAILWAY CAR AND FINE COACH VARNISHES.

Cor. West and West 12th sts., New York.

JOHN W. MASURY & SON,

MAKERS OF STRICTLY FIRST-CLASS

Railway Varnishes,

AND MANUFACTURERS OF

CAR BODY COLORS.

By permission, we refer to the following Companies, for whom we have made Special Colors:

PENNSYLVANIA RAILROAD CO., Enoch Lewis, Purchasing Agent, Philadelphia, Pa.
PENNSYLVANIA CO., Wm. Mullins, General Purchasing Agent, Pittsburg, Pa.
BALTIMORE & OHIO RAILROAD CO., N. S. Hill, Purchasing Agent, Baltimore Md.
CHICAGO & ALTON RAILROAD CO., A. V. Hartwell, Purchasing Agent, Chicago, Ill.
CHICAGO & NORTHWESTERN RAILROAD CO., R. W. Hamer, Purchasing Agent, Chicago, Ill.
LEHIGH VALLEY RAILROAD CO., L. Chamberlin, Purchasing Agent, Philadelphia, Pa.
NORTHERN RAILROAD OF CANADA, F. W. Cumberland, Superintendent, Toronto, Ont.
NAUGATUCK RAILROAD CO., G. W. Beach, Superintendent, Waterbury, Conn.
PHILADELPHIA, WILMINGTON & BALTIMORE RAILROAD CO., S. A. Hodgman, Superintendent of Motive Power, Wilmington, Del.
NEW YORK, NEW HAVEN & HARTFORD RAILROAD CO., R. N. Dowd, Commissary, New Haven, Conn.
UNION PACIFIC RAILROAD CO. } A. D. Clark, Purchasing Agent, Omaha, Neb.
KANSAS " " }
CHICAGO, BURLINGTON & QUINCY RAILROAD CO., Wm. Irving, Purchasing Agent Chicago, Ill.
LOUISVILLE, CINCINNATI & LEXINGTON RAILROAD CO., Wm. Mahl, Purchasing Agent, Louisville, Ky
GRAND TRUNK RAILWAY N. Wall, Port Huron, Mich.
LITTLE ROCK & FORT SMITH RAILROAD CO., T. Hartman, Purchasing Agent, Little Rock, Ark.
GILBERT & BUSH CO., Troy, N. Y. } Railroad Car Builders.
WASON MANUFACTURING CO., Brightwood, Mass.
BILLMEYER & SMALL MANUFACTURING CO., York, Pa.
JACKSON & SHARP CO., Wilmington, Del.
BARNEY & SMITH MANUFACTURING CO., Dayton, O.

The advantages derived from the use of such Special Colors are many, a few of which are found below:
ABSOLUTE UNIFORMITY OF SHADE. DURABILITY, as we use perfectly pure materials. **SAVING OF MONEY,** because of small quantity required. **SAVING OF TIME,** in the putting on of the same. **SAVING OF LABOR AND MATERIAL,** as no extra amount of Varnish will be required to hide a sanded surface. **LARGER DEGREE OF CERTAINTY** that there will be an absence of cracked work, as our mixtures are all uniform, being done by weight only.

We make any desired shade, if only being necessary that purchasers furnish us with sample of color desired, stating the time they would like to have the paint dry in.

We shall be glad to furnish samples and give prices to any who may wish to avail themselves of the above advantages.

Very respectfully,

JOHN W. MASURY & SON, New York and Chicago.

Established 1856.

Shipman & Bolen,

No. 352 Mulberry St.,
Newark, New Jersey.

Manufacturers of fine

Railway Varnishes,

BACKUS

Railway Oils.

KEROSENE
HEAD-LIGHT, SIGNAL,
ENGINE AND CAR OILS.

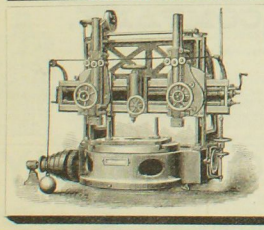
NIAGARA REFINING CO.

H. M. BACKUS
GEN'L MANAGER.

BACKUS
RAILWAY

Car Greases,

BUFFALO, N. Y.



NILES TOOL WORKS,

Hamilton, Ohio.

MACHINE TOOLS

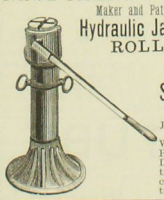
FOR

Railroad, Locomotive and Car Shops.

ALL FROM NEW AND IMPROVED PATTERNS

PRICES AND PHOTOGRAPHS ON APPLICATION.

RICHARD DUDGEON,
No. 24 Columbia St., New York,
Maker and Patentee of IMPROVED



Hydraulic Jacks, Punches
ROLLER-TUBE
EXPANDERS,
AND
DIRECT ACTING
Steam Hammers.

JACKS FOR PRESSING ON CAR-WHEELS OR CRANK PINS MADE TO ORDER. Communications by letter will receive prompt attention.

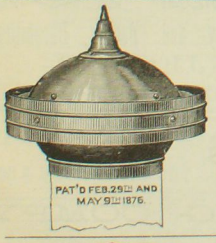
JOYCE, CRIDLAND & CO.,
Cor. Wyandotte St. and Railroad,
DAYTON, O.,
MANUFACTURERS OF

LEVER,
COMPOUND LEVER,
AND
Screw Jacks.

We make 27 varieties of these Jacks, and have more in process of construction.

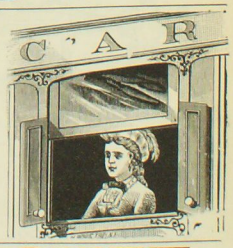
Send for Illustrated Catalogue and Price List.

SIMPLE, DURABLE AND CHEAP.



GLOBE
VENTILATORS,
For Ventilation of
Cars, Depots, Round-Houses
AND
WATER CLOSETS.
Twenty-five Sizes, from 2 in. to 48 in. inclusive.

GLOBE DEFLECTORS,
FOR
PREVENTING DUST OR CINDERS FROM ENTERING CARS.



MANUFACTURED BY THE
GLOBE VENTILATOR COMP'Y,
203 River Street, - - - - TROY, N. Y.
Catalogue and Price-List Furnished on Application.

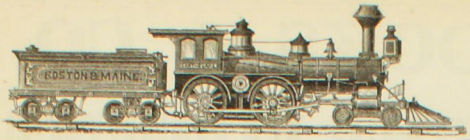
TRADE MARKS:

"Phosphor-Bronze."

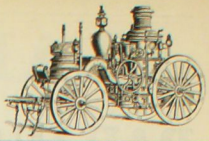
PHOSPHOR-BRONZE

FOR BEARINGS OF LOCOMOTIVES, CARS AND MACHINERY
SLIDE VALVES, CYLINDER RINGS AND STEAM CONNECTIONS.
SAVES OIL AND REPAIRS, PREVENTS DELAY TO TRAINS, AND NEVER CUTS THE JOURNALS.

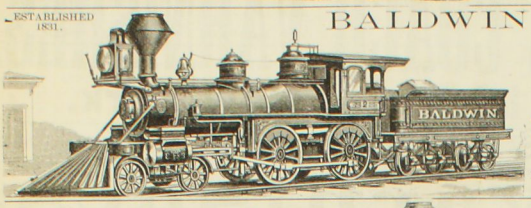
Pamphlets and particulars on application to
THE PHOSPHOR-BRONZE SMELTING CO., Limited,
Office, 512 Arch Street, Philadelphia, Pa.
Owners of the United States Phosphor-Bronze Patents. Sole Manufacturers of Phosphor-Bronze in the United States.



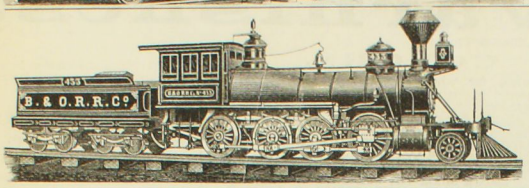
MANCHESTER LOCOMOTIVE WORKS,
MANUFACTURERS OF
LOCOMOTIVES,
AND THE
AMOSKEAG STEAM FIRE-ENGINE.
JOHN A. BURNHAM, President. WM. G. MEANS, Treas., Boston, Mass.
ARETAS BLOOD, Agent, Manchester, N. H.



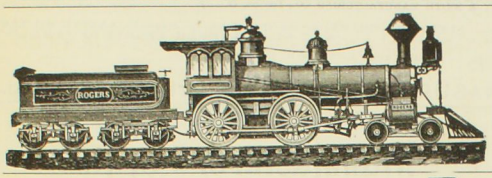
ESTABLISHED 1831.



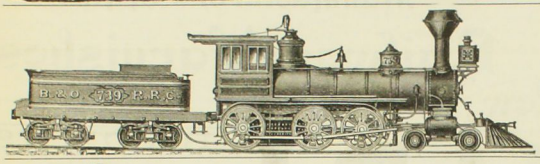
BALDWIN LOCOMOTIVE WORKS,
PHILADELPHIA, PA.
BURNHAM, PARRY, WILLIAMS & CO., PROPRIETORS,
GEO. BURNHAM, CHAS. T. PARRY, EDWARD H. WILLIAMS, — MANUFACTURERS OF — WM. P. HENSZEY, EDW. LONGSTRETH, JOHN H. CONVERSE.
LOCOMOTIVE ENGINES, CAPACITY, 600.
Adapted to every variety of service, and built accurately to standard gauges and templates. Like parts of different engines of same class perfectly interchangeable.
Passenger and Freight Locomotives, Mine Locomotives, Narrow Gauge Locomotives, Steam Street Cars, etc. Illustrated Catalogues furnished on application of customers. All work thoroughly guaranteed.



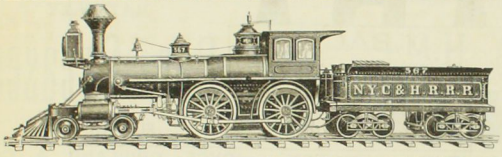
DANFORTH
LOCOMOTIVE AND MACHINE COMPANY,
PATERSON, N. J.
NEW YORK OFFICE, - - 115 BROADWAY.
H. A. ALLEN, AGENT.
JOHN COOKE, President. J. T. BLAUVELT, Vice-Pres. — PATERSON, N. J. — WM. BERDAN, Sec. & Treas. JAMES COOKE, Supt.



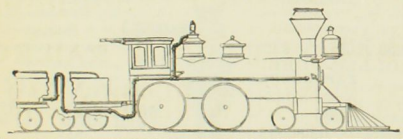
ROGERS LOCOMOTIVE AND MACHINE WORKS,
PATERSON, N. J.
New York Office, 44 Exchange Place.
Manufacturers of Locomotive Engines and Tenders and other Railroad Machinery.
J. S. ROGERS, President. R. S. HUGHES, Secretary. WM. S. HUDSON, Sup't. — PATERSON, N. J. — R. S. HUGHES, Treas., 44 Exchange Place, New York.



PITTSBURGH LOCOMOTIVE AND CAR WORKS,
PITTSBURGH, PA.,
MANUFACTURERS OF
Locomotive Engines for Broad or Narrow Gauge Roads,
From standard designs, or according to specifications, to suit purchasers.
Tanks, Locomotive or Stationary Boilers Furnished at Short Notice.
D. A. Stewart, Prest. D. A. Wightman, Supt. Wilson Miller, Sec. & Treas.



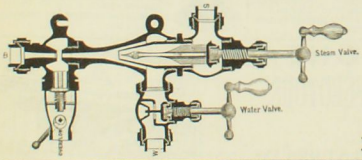
SCHENECTADY LOCOMOTIVE WORKS.
CHAS. G. ELLIS, President. EDWARD ELLIS, Treasurer.
WALTER McQUEEN, Vice-President.
SCHENECTADY, N. Y.



THE ASHTON VALVE COMPANY,
271 Franklin Street, Boston, Mass.

The Ashton Blow-back Safety-valve is constructed so as to conduct the escape steam which is blown off back to the tender, or to the smoke-box and up the chimney. By this arrangement the heat of the escape steam, instead of being wasted as it is when an ordinary safety-valve blows off, is communicated to the cold water in the tender. This not only results in an important economy, but it renders the escaping steam noiseless, and the increase of temperature of the water has a tendency to deposit some of its impurities before it is pumped into the boiler. It thus *stops the noise*; *saves fuel*; *and all engines steam better and faster, and do more effective work with these valves* than with those in ordinary use.

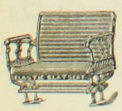
NATIONAL TUBE WORKS COMPANY,
BOSTON, MASS., and McKEESPORT, PENN.
TRADE LOCOMOTIVE MARK.



Wrought-Iron Pipe and Tubes all sizes.
Special Semi-Steel Tubes for Locomotives, Extra Heavy and Double Durability.
MACK'S PATENT INJECTOR.
New York Office, 104 John Street. Chicago Office, 159 Lake Street.

EAMES VACUUM BRAKE CO.,
RAILWAY TRAIN BRAKES,
P. O. Box 2878. SALES OFFICE, 15 GOLD ST., NEW YORK. Represented by THOMAS PROSSER & SON.
THE EAMES VACUUM BRAKE is confidently offered as the most efficient, simple, durable, and cheapest power Brake in the market. Can be seen in operation upon over seventy roads.

HALE & KILBURN MANUFACTURING COMP'Y
48 AND 50 NORTH SIXTH STREET, PHILADELPHIA, PA.,


ELASTIC SLAT SEAT.

REFERENCES.
N. Y. C. & H. R. R. CO.
N. Y. ELEVATED R. R.
ILL. CENTRAL R. R.
PULLMAN P. C. CO.
PENN. R. R. CO.
N. Y. & N. ENG'D R. R.
BALT. & O. R. R.
AND ONE HUNDRED OTHERS.

RATTAN SPRING SEAT.

EXTENSIVE MAKERS OF
PATENTED CAR SEATS
AND
SPRINGS.

SPRING EDGE SEAT.

ESTIMATES, CIRCULARS AND SAMPLES FURNISHED ON APPLICATION.

PARLOR CAR CHAIR

A. A. THOMSON & CO.,

IMPORTERS AND DEALERS IN

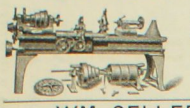
Genuine Russia Sheet Iron.

THE BEST FOR LOCOMOTIVE JACKETS.

Tin and Roofing Plates especially adapted for Railroad Car Roofs, Pig Tin, Zinc, Solder, Lead, etc.

Nos. 213 and 215 WATER STREET, NEW YORK.

THE GRAY NINETEEN INCH LATHE.



Manufactured with SPECIAL MACHINERY and in conformity with U. S. Standard Gauges. Every lathe BELTED and put to ACTUAL WORK before leaving the shop.

A PERFECT MACHINE AT A MODERATE PRICE.

G. A. GRAY, JR., & CO.,

CINCINNATI, OHIO.

WM. SELLERS & CO., PHILADELPHIA,

MANUFACTURERS

MACHINE TOOLS AND TWEDDLE'S HYDRAULIC RIVETER.

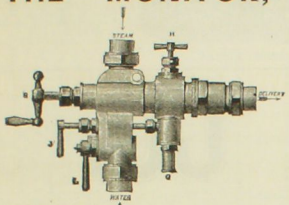
THE 1876 INJECTOR BOILER-FEEDER.

SIMPLE, RELIABLE AND EFFECTIVE.

Started, Regulated and Stopped by one Motion of a Lever.

Branch Office, 79 Liberty Street, NEW YORK.

THE "MONITOR,"



A NEW LIFTING INJECTOR FOR LOCOMOTIVES.

Send for Descriptive Circular.

FRIEDMANN'S PATENT

Locomotive Injectors

LIFTING & NON-LIFTING

With all Latest Improvements.

EJECTORS, OILERS, LUBRICATORS, &c.

NATHAN & DREYFUS,

NEW YORK.

RUBBER ROOFING.

Weight but 60 pounds to 100 square feet, and is the cheapest and lightest Roof that can be put on. It can be laid by any one, and is superior to all other Roofing for cheapness, fire-proof qualities and durability. Being ready for use, very elastic, and requiring no tar or gravel, is strongly recommended by architects, corporations, public institutions, builders and leading men in all sections, for new, steep or flat roofs. Can also be laid over very old shingles, with positive satisfaction. Will not smell in hot weather, sheds water rapidly, handsome finish, is as nearly fire-proof as it is possible to make any roofing, and is as durable as any tin roof under similar conditions. PRICE, $3.25 per square of 10 by 10 feet. This includes everything complete for a New Roof. Send for Circulars giving further particulars.

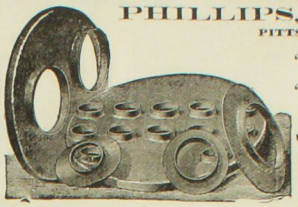
INDIANA PAINT AND ROOFING CO., INDIANAPOLIS, IND.

SLIGO ROLLING MILLS.

PHILLIPS, NIMICK & CO.,

PITTSBURGH, PA.,

MANUFACTURERS OF



"Sligo" Boiler Plate and Fire-Box Iron.

"Sligo" Bar, Band, Sheet and Angle Iron.

"Sligo" Stay Bolt Iron,

Used by the Principal Railroads in the United States, and Warranted Unexcelled.

"TYRONE" BRAND BAR SHEET, TANK PLATE and ANGLE IRON.

Quality our Specialty.

BOILER HEADS AND FLUE HOLES FLANGED TO ORDER.

SEND FOR PRICE-LIST.

THE·STOW·FLEXIBLE·SHAFT·CO·LIMITED·

As this shaft transmits power through any number of curves, its value in the railroad and general machine shop, is at once apparent. We have designed, and keep in stock, a series of special tools for use with the shaft, as: PORTABLE DRILLS for metals; AUGER CHUCKS for wood; CLAMPS for emery and buffing wheels, etc. CATALOGUE and PRICE LIST on application.

1505—1509 PENNSYLVANIA AVE., PHILADELPHIA, PA.

The Flexible Shaft is now used by 70 Railroads and 7 Locomotive Works in the U. S. and Canada.

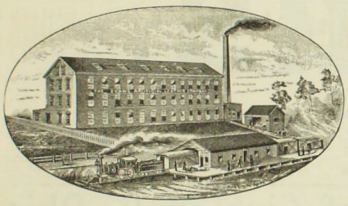
EWING, MITCHELL & CO.,

RAILWAY, MILL, MINE AND MACHINISTS' SUPPLIES AND TOOLS,

No. 137 FIRST AVENUE, PITTSBURGH, PA.

ECONOMY AND BEAUTY COMBINED IN THE

EVANS ARTIFICIAL LEATHER.

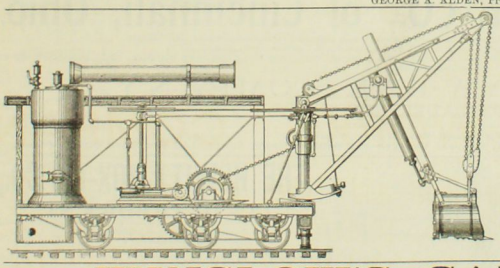


The attention of MASTER CAR-BUILDERS and PURCHASING AGENTS is specially called to these goods for upholstering Railroad Cars, and for panel and ceiling decorations for the finest palace cars.

This is the only substitute for UPPER LEATHER in the world that has PROVED SATISFACTORY OR PRACTICAL, and that cannot be distinguished from leather. Being very handsome and durable, not affected by heat or cold, and impervious to oil or water, it is for many purposes superior to leather, and costs from 33 to 50 per cent. less. It is manufactured in various weights and in every desirable shade of color, including also gold, silver and bronze. It comes in rolls of 30 and 50 yards, and 36 and 50 inches in width. A corporation has recently been organized under the laws of New Hampshire—where the factory is located—for the manufacture of this Artificial Leather, under various letters patent granted by the United States. A full assortment of the above most desirable goods can be found and articles made from it shown, at office and salesrooms, 92 Pearl street, corner of High street, Boston, Mass. Send for price list to the

Evans Artificial Leather Company.

GEORGE A. ALDEN, President. H. S. CHASE, Treasurer. WALTER N. DOLE, General Agent.



DILL'S IMPROVED IRON RAILROAD

STEAM SHOVEL & DERRICK CAR,

PATENTED 1880 AND 1881,

for loading ballast, moving heavy weights and clearing wrecks. Will do more work with less labor than any other Excavator. Crane and dipper operated by direct steam. Expense of chain and gearing avoided. The dipper is easily detached, leaving the machine a most simple, strong and effective derrick. Self-propelling on standard gauge; requires only 15 feet head room; will lift 18 feet and swing 25 feet from centre of track. Weight about 30 tons. We have standard sizes on hand, and make any special sizes to order.

INDUSTRIAL WORKS.

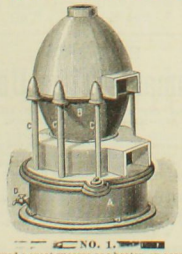
C. R. WELLS, Secretary, Bay City, Mich.; or

McMANN & RUSSELL, 58 Gold Street, New York

WINSLOW'S SAFETY CAR STOVE,

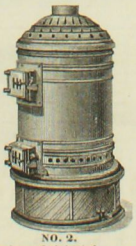
MANUFACTURED BY A. P. WINSLOW & CO., 89 SENECA STREET, CLEVELAND, OHIO.

No. 1.—Stove without Jacket. Letter A, Cast-iron Tank, containing 10 gallons of water, and will in ordinary cold weather, by one filling, last a week. Letter B, Cast-iron Base. Letter C, Perforated Cover. Letter D, Discharge Cock; Letter E, Filler.



NO. 1.

No. 2.—Stove as set up in use, and will burn either hard or soft coal, or coke. Price, $10.00, on cars here. This does not include Smoke or Air Pipes.



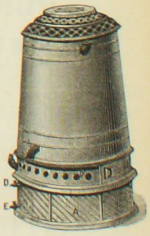
NO. 2.

No. 3.—Designed for conducting hot air along the sides of the ceiling, thereby preventing the usual change in the temperature of a room, and discharging the air every three to five minutes, forcing the heavy, cold air to the floor, and the hot air—thus cooling and ventilating the car perfectly.

NO. 3.

BAKER HEATER,

with Water Jacket, as supplied to Heaters on L. S. & M. S. Passenger Cars, and Mail or Palace Cars that have baker Heaters can be furnished at the same price, as above cut.



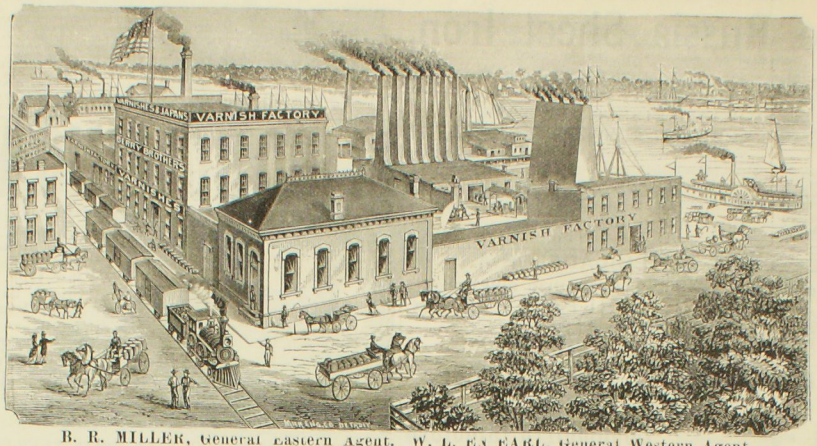
It has proved a great success as a heater, on account of the very large volume of air heated.

It also fills the great desideratum so long sought for, *perfect ventilation* during the summer by discharging a constant stream of cold air through the registers, keeping car free from dust and cinders.

BERRY BROTHERS, DETROIT, MICH., MANUFACTURERS OF RAILWAY VARNISHES.

ESTABLISHED IN 1858. USE BERRY BROTHERS' RAILWAY VARNISHES.

Frontage on Wight Street, 218 ft.



Frontage on Lieb Street, 200 ft.

ESTABLISHED IN 1858. USE BERRY BROTHERS' RAILWAY VARNISHES.

B. R. MILLER, General Eastern Agent. W. L. EARL, General Western Agent.

HUGH SHIELS & CO.

IMPORTERS AND DEALERS IN

Mahogany and Car-Builders' Cabinet Woods.

AMERICAN AND FRENCH

VENEERS.

Southeast Corner John and Augusta Streets,

CINCINNATI, O.

THE CONTINUOUS DRAW-BAR CO., of Cincinnati, Ohio,

Will sell Railroad Rights for their valuable Continuous Draw-Bars for Passenger and Freight Cars, which are now so rapidly superseding the old drawing attachments.

We have purchased and now control the following patents: Allen Middleton, Phila., 2 patents; Griffith & Patterson, Cincinnati, Ohio; J. Caum, Phila.; and D. Holt, Albany, N. Y.

Upward of 30,000 cars, including those of the leading trunk lines of the country, have already been equipped with these draw-bars, and they are every day becoming more popular. Their application saves railroad companies from 20 to 40 per cent. in first cost, and not less than 50 per cent. in daily running repairs. For particulars address

THE CONTINUOUS DRAW-BAR COMPANY,

945 RIDGE AVENUE, PHILADELPHIA.

ALLEN MIDDLETON, President; JOHN B. QUIRK, Secretary and Treasurer.
J. T. LEIGHTON, General Eastern and Southern Agent, New Haven, Conn.
SAMUEL GRIFFITH, General Western and Southwestern Agent, 142 Dearborn Street, Chicago.

WHITE LEAD.

JEWETT & SONS PERFECTION PURE WHITE LEAD TRADE MARK

We have made but ONE QUALITY of WHITE LEAD for the last twenty-three years. It is ground in Calcutta seed oil, and warranted perfectly pure

LINSEED OIL.

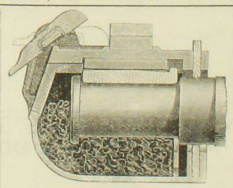
JEWETT'S PERFECTLY PURE LINSEED OIL RAW, BOILED & REFINED.

All Linseed Oil bearing the above brand delivered by us is of OUR OWN MANUFACTURE, and guaranteed absolutely pure.

Our BOILED OIL will be, as heretofore, POSITIVELY BOILED.

JOHN JEWETT & SONS,

181 FRONT STREET, NEW YORK.



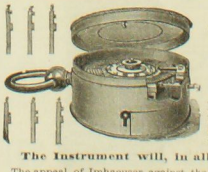
THE HEWITT BOX-LID CO.,

142 DEARBORN ST.,

CHICAGO, ILL.

We respectfully refer you to the following railroads using the Hewitt Cover:

K. C., St. J. & C. B.; M. R., Ft. S. & G.; C., B. & Q.; C., A. & St. L.; A., T. & S. F.; A. & N.; K. P.; F. & P. M.; D., L. & N.; D. & R. G.; M. C.; H. & St. J.; C. & V.; St. L., I. M. & S.; B. & M. R. (in Neb.); D. P.; L., L. & G.; L. E. & W.; L. P. & C.; I. C.; O. C.; St. L., V. & T. H.; St. P. & S. C.; N. P.; C. & E. I.; M. P.



BUERK'S

Watchman's Time Detector

Important for all Large Corporations and Manufacturing Concerns.

Capable of controlling with the utmost accuracy the motion of a watchman or patrolman as the same reaches different stations of his beat. The instrument is complete in itself, portable and as reliable as the best lever watch. It requires no fixture or wires communicating from room to room, as is the case with ordinary watch clocks.

The Instrument will, in all Cases, be Warranted Perfect and Satisfactory

The appeal of Imhaeuser against the decision of the Circuit Court of the United States, Southern District of New York, for infringing on my patent, was decided against him, at the last term of the Supreme Court of the United States, at Washington, D. C.

J. E. Buerk, Proprietor, No. 230 Washington Street, Boston.

P. O. BOX 979. ☞ In sending for circular or ordering the above, please mention this paper

DIRECTORY

of the Railroads of the United States and Canada, showing the gauge, length of road, number of locomotives and number of cars; and giving the names and titles of their principal officers in charge of the operating, purchasing and rolling stock departments.

A

Adirondack R. R. 4-8½ gauge 62 m. 3 lo. 62 cars.
C. E. Durkee, *Supt*....Saratoga, N. Y.
Jacob Myers, *M. M*....Saratoga, N. Y.
Jas. J. Travers, *M. C. B*....Saratoga, N. Y.
Alabama Great So'n R. R. (*See Cin., N. O. & T. P.*)
Albany & Susquehanna R. R. (*See D. & H. Canal Co.*)
Albert Ry. 4-8½ g. 51 m. 3 lo. 32 cars.
G. A. Robinson, *Manager*....Hillsboro, N. B.
Jas. McKay, *M. M. & C. B*....Hillsboro, N. B.
Allegany Central R. R. 3 gauge 30 miles.
Geo. D. Chapman, *Gen. Man*....Angelica, N. Y.
W. O. Chapman, *Gen. Supt*...Friendship, N. Y.
Allegheny Valley R. R. 4-9 g. 259 m. 75 lo. 1968 c.
David McCargo, *Gen. Supt. & Pur. Agt.*; and
C. B. Price, *Supt.* (Riv. Div.)....Pittsburg, Pa.
A. A. Jackson, *Supt.* (L. G. Div.).Brookville, Pa.
Geo. W. Glass, *M. M*....Verona, Pa.
R. Gunning, *M. C. B*....Verona, Pa.
Alliance & Lake Erie R. R. 3 g. 30 m. 3 lo. 112 cars.
W. E. Lewis, *Gen. Man*....Alliance, O.
Anderson, Leb. & St. L. R. R. 4-9 g. 19 m. 2 lo. 20 c.
J. A. Larnerd, *Rec. & Supt*....Anderson, Ind.
Annapolis & Elk Ridge R. R. 4-8½ g. 20 m. 4 lo. 29 c.
W. H. Bians, *Supt. & Pur. Agt*..Annapolis, Md.
John L. Beall, *M. Mach*....Annapolis, Md.
Arkansas Midland R. R. 3-6 g. 48 m. 4 lo. 45 cars.
A. H. Johnson, *Pr. & Gen. Man*...Helena, Ark.
J. B. Johnson, *M. M. & M. C. B*...Helena, Ark.
Ashland Coal & Iron Ry. 4-8½ g. 14 m. 2 lo. 122 c
W. F. Gaylord, *Gen. Supt*....Ashland, Ky.
Ashtabula & Pittsburgh Ry. (*See Penna. Co.*)
Asheville & Spartanburg R. R. 5 g. 49 m. 2 lo. 12 c.
Jas. Anderson, *Supt. & Pur. Agt*..Spart'b'g, S.C.
M. Fraser, *M. M*....Spartanburg, S. C.
W. B. Brown, *M. C. B*....Spartanburg, S. C.
Atchison, Topeka & Santa Fé. R. R.
4-8½ g. 1,846 m. 203 lo. 8,108 cars.
C. C. Wheeler, *Gen. Man*....Topeka, Kan.
W. S. Mellen, *Asst. Gen. Supt*....Topeka, Kan.
D. J. Chase, *Supt*....Topeka, Kan.
F. M. Smith, *Pur. Agt*....Topeka, Kan.
Geo. Hackney, *Supt. Lo. & Car. Dept*.... do.
Clem. Hackney, *M. M*....Topeka, Kan.
Eastern Div.: C. M. Rathbun, *Supt*..Topeka, Kan
Henry Hull, *G. F. Car Dept*....Topeka, Kan.
John Fagan, *M. M*....Atchison, Kan.
J. M. Smith, *M. M*....Kansas City, Mo.
W. W. Wheeler, *M. M*....Emporia, Kan.
Mid. Div.: H. R. Nickerson, *Supt*.Nickerson, Kan.
W. Y. Johnson, *M. M*....Nickerson, Kan.
J. Q. Adams, *M. M*....Dodge, Kan.
Col. Div.: W. W. Borst, *Supt*....La Junta, Col.
A. C. Stiles, *M. M*....La Junta, Col.
H. W. Somers, *M. M*....Raton, N. M.
Las Vegas D.: T. J. Seeley, *Supt*.Las Vegas, N.M.
L. H. Waugh, *M. M*....Las Vegas, N. M.
Rio G. Div.: F. Leach, Jr., *Supt*.San Marcial, N.M
M. C. Wheeler, *M. M*....Wallace, N. M.
T. Clyde, *M. M*....San Marcial, N. M.
H. P. Olcott, *M. M*....Deming, N. M.
Atlanta & West Point R. R. (*See Western of Ala.*)
Atlantic, Gulf & West India Transit R. R. 5 g. 203 m.
D. E. Maxwell, *Gen. Supt*....Fernadina, Fla.
Atlantic, Tenn. & Ohio R. R. 4-8½ g. 46 m. 2 lo. 26 c.
J. J. Gormley, *Supt*....Charlotte, N. C.
Atlantic & Pacific R. R. 4-8½ g. 286 m.
F. W. Smith *Gen. Supt*....Albuquerque, N. M.
B. W. Angell, *Div. Supt*....Albuquerque, N. M.
Geo. Chalender, *Supt. M. P. & M*.... do.
D. B. Sibley, *Pur. Agt*....Chicago, Ill.
Augusta & Knoxville R. R. 30 miles.
A. J. Twiggs, *Gen. Supt & M. M*..Augusta, Ga.

B

Baltimore & Ohio R. R.
4-8½ g. 1,539 m. 546 lo. 14,862 cars.
N. S. Hill, *Pur. Agt*....Baltimore, Md.
E. Ohio Riv. Div. 4-8½ g. 972 m.
W. M. Clements, *Mast. Trans*...Baltimore, Md.
N. E. Chapman, *Mast. of Mach*..Baltimore, Md.
A. J. Cromwell, *Asst. M. of M*..Baltimore, Md.
L. Packard, *M. C. B*....Baltimore, Md.
I. N. Kalbaugh, *M. M*....Baltimore, Md.
Wm. Edwards, *M. M*....Martinsburgh, Va.
Sam. Houston, *M. M*....Piedmont, Va.
Robert Maxwell, *M. M*....Cumberland, Va.
S. B. Crawford, *M. M*....Grafton, W. Va.
Alex. Laird, *M. M*....Parkersburg, W. Va.
Chas. Hirsch, *M. M*....Wheeling, W. Va.
Pitts. Div.: T. M. King, *Gen. Supt*...Pittsburg, Pa
J. E. Sampsell, *M. of Mach*...Connelsville, Pa.
Trans-Ohio Divs.: B. Dunham, *G. Man*...Newark, O.
W. H. Harrison, *Mast. of Mach*....Newark, O.
E. L. Weisgerber, *M. M*....Newark, O.
H. M. Ingler, *M. M*....Bellaire, O.
O. B. Perkins, *M. M*....Zanesville, O.
Andrew Beckert, *M. M*....Sandusky, O.
F. J. Gunther, *M. M*....Chicago Junction, O.
Chi. Div.: John Thomas, *Supt*....Chicago, Ill.
Benj. Lowther, *M. M*....Garrett, Ind.
W. C. Wilkinson, *M. M*....Kingston, Ill.
Baltimore & Potomac R. R. (*See Penna. R. R.*)
Bangor & Piscataquis R. R. 4-8½ g. 63 m. 4 lo. 87 cars.
Arthur Brown, *Supt*....Bangor, Me.
C. S. Nason, *M. M*....Bangor, Me.
Barclay R. R. 4-8½ g. 16 miles.
J. B. Judd, *Supt*....Towanda, Pa.
Bath & Hammondsport R. R. 3 g. 9 m. 1 lo. 15 cars.
M. H. Hall, *Supt*....Hammondsport, N. Y
Allen Wood, *M. M*....Hammondsport, N. Y.
Battle Mountain & Lewis Ry. 3 gauge 11 miles.
L. B. Ball, *Supt. & Pur. Agt*....Lewis, Nev.
Bedford, Springville, Owensburg & Bloomfield Ry.
3 g. 41 m. 5 lo. 65 cars.
Jas. W. Kennedy, *Gen. Supt. & Pur. Agt.*; and
Capt. Geo. Elliott, *M. M*....Bedford, Ind.
Richard G. Elliott, *M. C. B*....Bedford, Ind.
Bellaire & South-Western Ry. Co. 3 g. 42 m. 3 lo. 29 c.
S. J. Cochren, *Gen. Man*....Bellaire, O.
Bell's Gap R. R. 3 g. 23 m. 2 lo. 35 cars.
R. G. Ford, *Supt*....Bellwood (P. O.), Pa.
Belt R. R. 4-8½g. 12 m. 10 lo.
M. A. Downing, *Gen. Man*....Indianapolis, Ind.
Bennington & Rutland Ry. 4-8½ g. 9 m. 10 lo. 214 c.
F. C. White, *Supt. & Pur. Agt*..Bennington, Vt.
G. W. Blanchard, *M. M*....Rutland, Vt.
Bodie Lumber Co. 3 g. 34 miles.
Thomas Holt, *Supt. & Pur. Agt*....Bodie, Cal
E. M. Luckett, *M. M. & C. B*....Bodie, Cal
Boston, Barre & Gardner. 4-8½ g. 36 m. 7 lo. 107 c.
H. M. Witter, *Supt. & Pur. Agt*.Worcester, Mass.
Chas. F. Brigham, *M. M*....Worcester, Mass.
Boston, Concord, Montreal & White Mts. R. R.
4-8½ g. 167 m. 34 lo. 677 cars.
James A. Dodge, *Gen. Man*....Plymouth, N. H.
J. Thos. Vose, *Pur. Agt*....Boston, Mass.
R. Adams, *M. M*....Lake Village, N. H.
G. A. Ferguson, *Asst. M. M*...Lake Village, N. H.
L. D. Pickering, *M. C. B*....Lake Village, N. H.
Boston, Hoosac Tunnel & W'n Ry.
4-8½ g. 53 m. 17 lo. 1,112 cars.
W. L. Burt, *Pres. & Gen. Man*....Boston, Mass.
J. L. Wellington, *Gen. Supt*.Mechanicville, N. Y.
J. L. Wellington, *P. A*....Mechanicville, N. Y.
W. H. Powell, Jr., *M. M*....Mechanicville, N. Y.
John S. Ellis, *M. C. B*....Mechanicville, N. Y.
Boston, Lowell & Concord R. Rs.
4-8½ g. 360 m. 110 lo. 2,211 cars.
H. C. Sherburne, *Gen. Man*....Boston, Mass.
F. H. Nourse, *Pur. Agt*....Boston, Mass.
Jas. T. Gordon, *M. M*....Concord, N. H.
J. N. Lauder, *Supt. Roll. Stock*.Concord, N.H.
Boston & Lowell Div.:
J. F. Crockett, *M. Trans*....Boston, Mass.
Concord Divs.:
H. E. Chamberlain, *Supt*....Concord, N. H.
J. T. Gordon, *M. M. & C. B*...Concord, N. H.
Boston, Revere Beach & Lynn R. R. 3 g. 9 m. 5 lo. 46 c.
E. H. Whorf, *Supt. & Pur. Agt*...Boston, Mass.
J. L. Folsom, *M. M*....Boston, Mass.
John Coghlan, *M. C. B*....Boston, Mass.
Boston, Winthrop & Pt. Shirley. 3 g. 2½ m. 1 lo. 8 c.
C. A. Parks, *Pres. & Man*....Boston, Mass.
Boston & Albany R. R. 4-8½ g. 372 m. 248 lo. 6,012 c.
C. O. Russell, *Gen. Supt*....Springfield, Mass.
W. H. Barnes, *Asst. Supt*....Boston, Mass.
A. B. Underhill, *Supt. M. P*...Springfield, Mass.
F. D. Adams, *M. C. B*....Allston, Mass.
W. H. Russell, *Div. Supt*....Albany, N. Y.
Horace Eddy, *For. M. Sh*..Springfield, Mass.
J. B. Weston, *For. C. Sh*...Springfield, Mass.
G. H. Colby, *For. M. Sh*....Boston, Mass.
T. B. Purvis, *For. M. Sh*...Greenbush, N. Y.
J. E. Doran, *For. C. Sh*....Greenbush, N. Y.
Boston & Maine R. R. 4-8½ g. 206 m. 84 lo. 2,100 c.
J. T. Furber, *Gen. Supt. & P. A*..Boston, Mass.
Wm. Smith, *M. M*....Boston, Mass.
D. C. Richardson, *M. C. B*....Lawrence, Mass.
Boston & N. Y. Air Line. 4-8½ g. 53 m. 9 lo. 156 c.
Jos. H. Franklin, *Supt*....New Haven, Conn.
Boston & Providence R. R. 4-8½ g. 67 m. 47 lo. 866 c.
A. A. Folsom, *Gen. Supt*....Boston, Mass.
Geo. Richards, *M. M*....Roxbury, Mass.
Jno. Lightner, *M. C. B*....Roxbury, Mass.
Bowling Green R. R. 4-8½ g. 5 m. 2 lo. 2 cars.
W. A. Wiggin, *Gen. Man*....Bowling Green, O.
H. B. Higgins, *Supt. & M. M*.Bowling Green, O.
Bradford R. R. (*See Olean, B. & W.*)
Bradford, Bordell & Kinzua R. R. 3 g. 30 m. 6 lo. 80 c.
B. C. Williams, *Supt. & Pur. Agt*..Bradford, Pa.
John Delaney, *M. M. & C. B*....Bradford, Pa.
Bradford, Eldred & Cuba R. R.
C. D. Williams, *Supt. & P. A*..Wellesville, N. Y.
Breakwater & Frankford R. R. (*See Junc. & Break.*)
Brighthope Ry. 3 g. 37 m. 3 lo. 193 cars.
Jas. R. Worth, *Supt*....Richmond, Va
A. Gary, *Supt. Way & Works*.Winterpock, Va.
Alex. Calder, *M. M*....Chester, Va.
Brooklyn, Bath & Coney Is. 4-8½ g. 7 m. 6 lo. 33 c.
Geo. A. Gunther, *Gen. Man*....Brooklyn, N. Y.
B'klyn, Flatbush & Coney Is. 4-8½ g. 7½ m. 7 lo. 52 c.
Robert White, *Supt*....Brooklyn, N. Y.
Brooklyn & Rockaway Bch. 4-8½ g. 3½ m. 3 lo. 18 c.
Wm. Warner, *Supt*....E. New York, N. Y.
Brunswick & Albany R. R. 5 g. 172 m. 13 lo. 170 c.
R. D. Meader, *Supt*....Brunswick, Ga.
Bucksport & Bangor R. R. 3 g. 18 m. 2 lo. 35 cars.
L. L. Lincoln, *Supt*....Bucksport, Me.
Buffalo, N. Y. & Phila. Ry. 4-8½ g. 121 m. 34 lo. 2,436 c.
Geo. S. Gatchell, *Gen. Supt*....Buffalo, N. Y.
J. H. Poole, *Pur. Agt*....Buffalo, N. Y.
Allen Vail, *M. M. & M. C. B*....Buffalo, N. Y.
Buff., Pittsburg & W'n R. R. 4-9 g. 165 m. 33 l. 506 c.
Oliver Watson, Jr., *Gen. Supt*....Oil City, Pa.
E. H. Witter, *Pur. Agt*....Buffalo, N. Y.
H. J. Bookhammer, *M. M*....Oil City, Pa.
John Monks, *M. C. B*....Oil City, Pa.
Burlington, Cedar Rapids & Northern Ry.
4-8½ g. 644 m. 62 lo. 2,120 cars.
C. J. Ives, *Gen. Supt*....Cedar Rapids, Ia.
Robt. Williams, *Supt*....Cedar Rapids, Ia.
T. Stickney, *Pur. Agt*....Cedar Rapids, Ia.
R. W. Bushnell, *M. M. & C. B*.Cedar Rapids, Ia.
Burlington & Lamoille R. R. 4-8½ g. 36 m. 3 lo. 61 c.
G. L. Linsley, *Gen. Man. & Supt*.Burlington, Vt.
F. G. Brownell, *M. M. & P. A*...Burlington, Vt.
Burlington & Mo. Riv. R. R. (in Neb.) (*See C., B & Q.*)
Burlington & North-West'n Ry. 3 g. 38 m. 3 lo. 85 c.
John T. Gerry, *Supt*....Burlington, Ia.
Burlington & Ohio River R. R.
G. P. Merrill, *Gen. Man. & Pur. Agt*.Chicago, Ill.
John K. Lape, *Supt. of Equip*....Chicago, Ill.

C

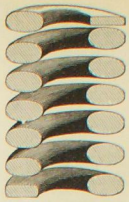
Cairo & St. Louis R. R. 3 g. 146 m. 22 lo. 708 cars.
Chas. Hamilton, *Gen. Supt*....St. Louis, Mo.
R. M. Pringle, *M. M*....East Carondelet, Ill.
Camden & Atlantic R. R. 4-8½ g. 79 m. 16 lo. 264 c.
F. A. Lister, *Supt & Pur. Agt*....Camden, N. J
Rufus Hill, *M. M*....Camden, N. J.
Samuel Wills, *M. C. B*....Camden, N. J.
Canada Southern Ry. 4-8½ g. 403 m. 89 l. 3,367 c.
W. P. Taylor, *Gen. Man*....Buffalo, N. Y.
A. F. Howland, *Pur. Agt*....St. Thomas, Ont.
W. A. Short, *Gen. M. M*....St. Thomas, Ont.
John Ortton, *Gen. M. C. B*....St. Thomas, Ont.
Can. Div.: W. E. Carroll, *Supt*..St. Thomas, Ont.
Robert Potts, *M. C. B*....St. Thomas, Ont.
U. S. Div.: E. P. Murray, *Supt*....Toledo, O.
O. P. Dunbar, *M. M*....Grosse Isle, Mich.
Canadian Pacific R. R. 4-8½ g. 551 m. 26 lo. 473 c.
W. C. Van Horne, *Gen. Man*....Ottawa, Ont
Eastern Div. 240 m. 16 lo. 276 cars.
A. Baker, *Gen. Supt*....Ottawa, Ont.
T. Blackwell, *Mech. Supt*....Brockville, Ont.
Western Div. 311 m. 10 lo. 207 cars.
J. M. Eagan, *Supt*....Winnipeg, Man.
W. R. Baker, *Pur. Agt*....Winnipeg, Man.
Cape F'r & Yadkin Val. R. R. 4-8½ g. 47 m. 3 lo. 31 c.
L. C. Jones, *Gen. Supt*....Fayetteville, N. C.
Isaac W. Clark, *M. M. & C. B*..Fayetteville, N. C.
Carolina Cen. R.R. 4-8½ g. 242 m. 24 lo. 456 cars.
V. Q. Johnson, *Gen. Supt*....Wilmington, N. C.
C. H. Roberts, *Pur. Agt*....Wilmington, N. C.
James Maglenn, *M. of Mach*..Laurinburg, N. C.
S. R. Ethridge, *M. C. B*....Laurinburg, N. C.
Carson & Colorado R. R. (*See Va. & Truckee.*)
Catasauqua & Fogelsville. 4-8½ g. 25 m. 6 lo. 577 c.
C. W. Chapman, *Supt. & P. A*.Catasauqua, Pa.
Thos. E. Evans, *M. M*....Catasauqua, Pa.
Chas. J. Holbach, *M. C. B*....Catasauqua, Pa.
Central and South-Western Railroads (Ga.).
5 g. 975 m. 127 lo. 1,779 cars.
W. G. Raoul, *V. P. and G. Man*.Savannah, Ga.
Wm. Rogers, *Gen. Supt*....Savannah, Ga.
Henry Yonge, *Pur. Agt*....Savannah, Ga.
Cen. Div.: D. D. Arden, *M. M*....Savannah, Ga.
R. M. Barthlemess, *M. C. B*....Savannah, Ga.
So.-West'n Div.: W. F. Shellman, *Supt*.Macon, Ga.
D. M. Gugel, *M. M*....Macon, Ga.
James A. Knight, *M. C. B*....Macon, Ga.
Central R. R. of N. J. 4-8½ g. 544 m. 294 lo. 27,198 c.
Gen. Man...New York, N. Y
B. W. Burnett, *Pur. Agt*....New York, N. Y.
W. H. Stearns, *Gen. Supt*....Elizabeth, N. J.
Cen Div.: Wm. Woodcock, *M. M*..Elizabeth, N. J.
Geo. Hackett, *M. C. B*....Elizabeth, N. J.
N.J.So.Div.: R. Blodgett, *Supt*...Manchester, N.J.
Lehigh & Susquehanna Div.:
W. S. Polhemus, *A. G. Supt*.Mauch Chunk, Pa.
L. C. Brastow, *M. M. & C. B*....Ashley, Pa.
Long Branch Div.:
J. F. Randolph, *Supt*....Elizabeth, N. J.
Central Iowa Ry. 4-8½ g. 191 m. 37 lo. 1,487 cars.
D. N. Pickering, *Gen. Supt*...Marshalltown, Ia.
John Player, *M. M*....Marshalltown, Ia.
T. L. Seevers, *M. C. B*....Marshalltown, Ia.
Central Pac. R. R. 4-8½ g. 2,777 m. 296 lo. 7,277 c.
A. N. Towne, *Gen. Supt*...San Francisco, Cal.
J. A. Fillmore, *A. G. Supt*..San Francisco, Cal.
J. R. Watson, *Gen. Pur. Agt*..Sacramento, Cal.
A. J. Stevens, *Gen. M. M*....Sacramento, Cal.
Benj. Welch, *Gen. M. C. B*....Sacramento, Cal.
G. J. Turner, *M. C. B*....Sacramento, Cal.
West'n; Visalia; Tulare Divs. and North'n R. R.:
A. D. Wilder, *Supt*....W. Oakland, Cal.
G. D. Welch, *M. M.* (W. Div.) W. Oakland, Cal.
W. D. Ludlow, *M. C. B.* (W. Div.) do.
S. J. Johnson, *M. M.* (T. Div.)....Tulare, Cal.
D. Rutherford, *M. M.* (N. Rd.).S. Vallejo, Cal.
Sacramento; Oregon Divs.; and Cal. Pac. R. R.
R. H. Pratt, *Supt*....Sacramento, Cal.
M. W. Cooley, *M. M*....Sacramento, Cal.
Phil. Douglas, *For. Car Sh*..Sacramento, Cal.
Truckee Div.: Frank Free, *Supt*.Wadsworth, Nev.
Geo. Gregg, *M. M*....Wadsworth, Nev.
Wm. McPherson, *F. Car Sh*..Wadsworth, Nev.
Humb't Div.: G. W. Coddington, *Supt*.Carlin, Nev.
W. F. Smith, *M. M*....Carlin, Nev.
J. C. Doughty, *For. Car Sh*....Carlin, Nev.
Salt Lake Div.: A. G. Fell, *Supt*....Ogden, Utah.
James Lamb, *M. M*....Terrace, Utah.
A. Sherburne, *For. Car Sh*....Ogden, Utah.
Los Angeles; and Yuma Divs. (So. Pac.):
E. E. Hewitt, *Asst. Supt*....Los Angeles, Cal.
James Velsir, *M. M*....Los Angeles, Cal.
J. S. Young, *For. Car Sh*....Los Angeles, Cal.
Arizona Div. (So. Pac.):
A. A. Bean, *Asst. Supt*....Tucson, Ariz.
Rio Grande and El Paso Divs. (So. Pac.):
J. Campbell, *Ass't Supt*....El Paso, Texas.
H. C. Standish, *For. Sh*....El Paso, Texas.
Central Vermont R. R. 4-8½ g. 548 m. 132 lo. 2,522 c.
J. W. Hobart, *Gen. Supt*....St. Albans, Vt.
J. M. Foss, *A. G. S. & S. of M. P. & M*..St. Albans, Vt
No. Div.: J. B. Futvoye, *Supt*....St. Johns, P. Q.
Rut. Div.: J. Burdett, *Supt*....Rutland, Vt.
N. L. Davis, *M. M. & C. B*....Rutland, Vt.
New London & No'n R. R. 143 m. 22 lo. 303 c.
G. W. Bentley, *G. Supt. & P. A*...New London, Ct.
I. W. Dow, *M. M*....New London, Ct.
S. O. Banks, *M. C. B*....New London, Ct.
Chagrin Falls & Southern R. R. 3 g. 6 miles.
Wm. Hutchins, *Manager*....Chagrin Falls, O.
J. W. Williams, *Supt*....Chagrin Falls, O.
Charleston & Savannah Ry. 5 g. 108 m.
C. S. Gasden, *Gen. Supt*....Charleston, S. C.
H. A. Ulmo, *M. M*....Charleston, S. C.
J. D. Murphy, *M. C. B*....Charleston, S. C.
Charlotte, Columbia & Augusta R. R. (*See Rich. & D.*)
Chateaugay R. R. 3 g. 34 m. 6 lo. 125 cars.
F. N. Corbin, *Supt*....Plattsburg, N. Y.
Chatham Branch Ry. 4-8½ g. 9 m. 1 lo. 2 cars.
J. B. Snowball, *Manager*....Chatham, N. B.
Chattaroi Ry. 4-8½ g. 43 miles 11 loco. 483 cars.
C. H. Rockwell, *Gen. Man. & P. A*.Ashland, Ky.
A. T. Daniel, *M. M*....Ashland, Ky.
Joseph Burley, *M. C. B*....Ashland, Ky.
Cheraw & Chester R. R. 3 g. 30 m. 3 lo. 38 cars.
W. H. Harding, *Pres. & Supt*....Chester, S. C.
Cheraw & Darlington R. R. (*See Wil. & Wel.*)
Cheraw & Salisbury R. R. (*See Wil. & Wel.*)
Cherokee R. R. 3 g. 37 m. 5 lo. 50 cars.
John Postel, *Manager*....Atlanta, Ga.
C. E. Scruten, *M. M. & C. B*....Cedartown, Ga.
Chesapeake, Ohio & So.-W'n. 5 g. 365 m. 8 lo. 102 c.
R. Meek, *G. S. & Pur. Agt*.Elizabethtown, Ky.
G. M. Taylor, *M. M. & C. B*....Paducah, Ky.
Chesapeake & Ohio Ry. 4-8½ g. 634 m. 149 l. 3,958 c.
C. W. Smith, *Gen. Man*....Richmond, Va.
A. H. Wood, *Asst. to Gen. Man*.... do.
A. S. Emmons, *Pur. Agt*....Richmond, Va.
John McFarland, *Supt. M. P*....Richmond, Va.
Eastern Div.: E. T. Smith, *Supt*..Richmond, Va.
J. N. King, *M. C. B*....Richmond, Va.
Hunt. Div.: W. P. Harris, *Supt.*; and
T. L. Chapman, *Asst. Supt. M. P.*; and
H. C. Bassinger, *M. C. B*.Huntington, W. Va.
Lex. Div.: J. D. Yarrington, *Supt*..Lexington, Ky.
Cheshire R. R. 4-8½ g. 80 m. 30 lo. 499 cars.
R. Stewart, *Gen. Man*....Keene, N. H.
H. H. Stone, *Pur. Agt*....Keene, N. H.
F. A. Perry, *M. M*....Keene, N. H.
A. E. Howard, *G. For. Car Sh*....Keene, N. H.
Chester & Lenoir Ry. 3 g. 50 m. 3 lo. 23 cars.
James Mason, *Supt*....Yorkville, S. C.
T. P. Beard, *M. M*....Yorkville, S. C.
Chicago, Burlington & Kan. City Ry. 4-8½ g. 181 m.
J. W. Smith, *Gen. Supt*....Keokuk, Ia.
A. B. Allen, *M. C. B*....Farmington, Ia.
Chicago, Burlington & Quincy R. R.
4-8½ g. 2,873 m. 441 lo. 16,499 cars.
T. J. Potter, *Gen. Man*....Chicago, Ill.
H. B. Stone, *Supt. Lo. & Car Dept*..Chicago, Ill.
Wm. Forsyth, *Mech. Eng*....Aurora, Ill.
(1) C., B. & Q., East of Mo. Riv. 1,938 miles.
H. B. Stone, *Gen. Supt*....Chicago, Ill.
Wm. Irving, *Pur. Agt*....Chicago, Ill.
Ill. Divs.: J. D. Besler, *Supt*....Galesburg, Ill.
Chi. Div.: Geo. Alexander, *Supt*....Aurora, Ill.
L. E. Johnson, *M. M*....Aurora, Ill.
Galesburg Div.: F. C. Rice, *Supt*.Galesburg, Ill.
Robert Colville, *M. M*....Galesburg, Ill.
St. L. Div.: W. R. Crumpton, *Supt*.St. Louis, Mo.
A. Forsyth, *M. M*....Beardstown, Ill.
Ia. & Mo. Divs.: K. H. Wade, *Supt*..Burlington, Ia.
East. Div.: C. M. Levy, *Supt*....Burlington, Ia.
Joel West, *M. M*....Burlington, Ia.
Mid. Div.: D. T. Bacon, *Supt*....Ottumwa, Ia.
West'n Div.: W. T. Ryder, *Supt*....Creston, Ia.
C. W. Eckerson, *M. M*....Creston, Ia.
(2) C., B. & Q., West of Mo. Riv. 935 miles.
G. W. Holdredge, *Gen. Supt*....Omaha, Neb.
Geo. Hargreaves, *Pur. Agt*....Omaha, Neb.
D. Hawksworth, *Gen. M. M*..Plattsmouth, Neb.
Bur. & Mo. Riv. & Neb. Ry. Divs.:
J. B. Phillippi, *Supt*....Lincoln, Neb.
O. R. Newton, *M. M*....Lincoln, Neb.
R. V. Div.: A. Campbell, *Supt*....Hastings, Neb.
A. & N. Div.: J. McConniff, *Supt*...Lincoln, Neb.
Chicago, Milwaukee & St. Paul R. R.
4-8½ g. 3,951 m. 425 lo. 13,659 cars.
S. S. Merrill, *Gen. Man*....Milwaukee, Wis.
W. C. Van Horne, *Gen. Supt*...Milwaukee, Wis.
J. T. Crocker, *Pur. Agt*....Milwaukee, Wis.
J. M. Lowry, *Gen. M. M*....Milwaukee, Wis.
La Crosse; Pr. du Chien; Wis. Val.; Chi.; and
Chi. & Pac. Divs.:
H. C. Atkins, *Supt*....Milwaukee, Wis.
John Bailie, *M. C. B*....Milwaukee, Wis.
Northern Div.: L. B. Rock, *Supt*..Milwaukee, Wis.
Wm. E. Kittredge, *M. C. B*..Milwaukee, Wis.
So.-Wn. Divs.: D. A. Olin, *Supt*....Racine, Wis.
John Taylor, *M. M*....Racine, Wis.
E. A. Eddy, *M. C. B*....Racine, Wis.
Lines West of Mississippi River:
C. H. Prior, *A. Gen. Supt*....Minneapolis, Minn.
H. & D. Div.: C. W. Case, *Supt*.Minneapolis, Minn.
J. O. Pattie, *M. M*....Minneapolis, Minn.
Ia. & Minn. Div.: H. R. Williams, *Supt*. do.
So. M. Div.: F. D. Underwood, *Supt*.La Crosse, Wis
Ia. & Da. Div.: G. W. Sanborn, *Supt*.Mason City, Ia.
S. Cy. & Da. Div.: J. Jackson, *Supt*.Sioux City, Ia.
F. H. Moulton, *M. M*....Yankton, Dak.
M. Pt. Div.: G. W. Cobb, *Supt*....Mineral Pt., Wis.
Dubuque Div.: J. H. Jenkins, *Supt*..Dubuque, Ia
E. Smedley, *M. M*....Dubuque, Ia.
Chicago, Pekin & So.-Wn. R. R. 4-8½ g. 88 m. 8 lo. 455 c.
J. Murray, *Supt. & Pur. Agt*....Streator, Ill.
A. H. Cook, *Pur. Agt*....Chicago, Ill.
A. R. Overton, *M. M*....Joliet, Ill.
F. Shields, *M. C. B*....Streator, Ill.
Chicago, Rock Island & Pac. Ry.
4-8½ g. 1,381 m. 290 lo. 17,799 cars.
R. R. Cable, *V. P. & Gen. Man*....Chicago, Ill.
A. Kimball, *Gen. Supt*....Davenport, Ia.
F. A. Marsh, *Pur. Agt*....Chicago, Ill.
T. B. Twombly, *Gen. M. M*....Chicago, Ill.
B. K. Verbryck, *Gen. M. C. B*....Chicago, Ill.
Ill. Div.: R. H. Chamberlin, *Supt*....Chicago, Ill.
R. Biester, *M. M*....Chicago, Ill.
Sam'l Pullman, *M. C. B*....Chicago, Ill.
Ia. Div.: H. F. Royce, *Supt*....Des Moines, Ia.
J. G. Crockett, *M. M*....Stuart, Ia.
Jas. E. Morrill, *M. M*....Davenport, Ia.
Chas. M. Leonard, *M. C. B*....Davenport, Ia.
So.-Wn. Div.: G. F. Walker, *Supt*....Trenton, Ia.
R. A. Carscadin, *M. M*....Trenton, Ia.
Chas. R. Best, *M. C. B*....Trenton, Ia.
K. & Des. M. Div.: Jno. Given, *Supt*...Keokuk, Ia.
S. W. Wakefield, *M. M*....Keokuk, Ia.
Henry Kummer, *M. C. B*....Keokuk, Ia.
Chi., Saginaw & Can. R. R. 4-8½ g. 38 m. 4 lo. 61 c.
Jas. T. Hall, *Supt*....St. Louis, Mich.
Chicago, St. Louis & New Orleans R. R.
4-8½ g. 571 m. 101 lo. 1,913 cars.
J. C. Clarke, *V. P. & G. Man*..New Orleans, La
L. T. Brien, *Asst. Gen. Man*..New Orleans, La.
C. M. Sheafe, *Gen. Supt*....New Orleans, La.
J. C. Febiger, Jr., *Pur. Agt*...New Orleans, La.
W. H. Purdy, *Supt. Mach*..McComb City, Miss.
Geo. W. Baxter, *M. C. B*...McComb City, Miss.
So. Div.: E. D. Anderson, *Acting Supt*. do.
E. D. Anderson, *M. M*....McComb City, Miss.
No. Div.: J. G. Mann, *Supt*....Jackson, Tenn.
J. M. Keith, *M. M*....Jackson, Tenn.
J. F. White, *M. M*....Water Valley, Miss.
Chicago, St. Paul, Minneapolis & Omaha Ry.
4-8½ g. 963 m. 31 lo. 619 cars.
C. F. Hatch, *Gen. Supt*....St. Paul, Minn.
W. H. S. Wright, *Pur. Agt*....St. Paul, Minn.
Matt. Ellis, *M. M*....St. Paul, Minn.
W. B. Rice, *M. C. B*....St. Paul, Minn.
Ea. & No. Div.: H. Spencer, *Supt*.St. Paul, Minn.
St. Paul Div.: J. F. Lincoln, *Supt*.St. Paul, Minn.
Sioux City Div.: T. P. Gere, *Supt*.Sioux City, Ia.
F. W. Heintselman, *Gen. For. Sh*.Sioux Cy, Ia.
Neb. Div.: G. V. Morford, *Supt*....Omaha, Neb.
Chicago, Texas & Mexican Central Ry.
4-8½ g. 52 m. 4 lo. 60 cars.
J. T. Odell, *Gen. Supt*....Dallas, Tex.
Chas. Howard, *Pur. Agt*....Chicago, Ill.
Chicago & Alton R. R. 4-8½ g. 840 m. 207 lo. 5,504 c.
J. C. McMullin, *Gen. Man*....Chicago, Ill.
C. H. Chappell, *G. Supt. & A. G. Man*. do.
A. V. Hartwell, *Pur. Agt*....Chicago, Ill.
Wm. Wilson, *Supt. of Mach*...Bloomington, Ill.
Jos. Townsend, *G. For. Car Dept*. do.
Chi. Div.: A. M. Richards, *Supt*..Bloomington, Ill.
St. Louis Div.: T. M. Bates, *Supt*..Roodhouse, Ill.
Kan. Cy. Div.: O. Vaughan, *Supt*....Slater, Mo.
Wm. McPhail, *M. M*....Slater, Mo.
Chicago & Block Coal Ry. 4-9 g. 15 m.
A. F. Beach, *Gen. Man*....Veedersburg, Ind.
Chi. & East'n Ill. 4-8½ g. 248 m. 56 lo. 3,000 cars.
O. S. Lyford, *Gen. Supt. & Pur. Agt*.Chicago, Ill.
P. W. Drew, *M. Trans*....Chicago, Ill.
Allen Cook, *M. M*....Danville, Ill.
Jas. T. Kerney, *M. C. B*....Danville, Ill.
Chicago & Grand Trunk Ry. (*See Grand Trunk.*)
Chicago & Indianapolis Air Line, 3 g. 67 m.
T. H. Hiner, *Manager*....Delphi, Ind.
Chicago & Iowa R. R. 4-8½ g. 104 m. 15 lo. 237 cars.
W. H. Holcomb, *Rec*....Rochelle, Ill.
S. H. S. Bryan, *M. M*....Aurora, Ill.
Chicago & Northwestern Ry.
4-8½ g. 2,988 m. 476 lo. 16,673 cars.
Marvin Hughitt, *2d V. Prs. & G. M*.Chicago, Ill.
J. D. Layng, *Gen. Supt*....Chicago, Ill.
W. G. Brownson, *Asst. Supt*....Boone, Ia.
R. W. Hamer, *Pur. Agt*....Chicago, Ill.
Geo. W. Tilton, *Supt. M. P. & M.*; and
J. M. Boon, *A. Supt. M. P. & M*....Chicago, Ill.
Wis. and Mil. Divs. & Sheboygan & W'n Ry.:
Chas. D. Gorham, *Supt*....Chicago, Ill.
Gal. Div.: Chas. Murray, *Supt*....Chicago, Ill.
Pen'r Div.: W. B. Linsley, *Supt*....Escanaba, Mich.
Geo. H. White, *M. M*....Escanaba, Mich.
Mad. Div.: C. A. Swineford, *Supt*..Baraboo, Wis.
Win. & St. P. Div.: S. Sanborn, *Supt*.Winona, Minn
W. A. Scott, *M. M*....Winona, Minn.
Dak. Cen. Ry.: T. J. Nicholl, *Supt*....Huron, Dak.
Mil. & Mad. Ry.: J. B. Trull, *Supt*....Galena, Ill.
Ia. Div.: J. M. Whitman, *Supt*....Clinton, Ia.
J. O. Chapman, *M. M*....Clinton, Ia.
H. L. Preston, *M. C. B*....Clinton, Ia.
No. Ia. Div.: H. G. Burt, *Supt*....Eagle Grove, Ia.
Chicago & West Michigan:
Grand Rapids, Newaygo, & Lake Shore; and
Grand Haven R. Rs. 4-8½ g. 362 m. 38 lo. 1,217 c.
Geo. C. Kimball, *V. P. & G. Man*..Muskegon, Mich.
Albert Scott, *Supt*....Grand Rapids, Mich.
H. Park, *Pur. Agt*....Grand Rapids, Mich.
C. & W. M. Rd: C. M. Lawler, *Supt*.St. Joseph, Mich.
Russell Booth, *M. M*....Muskegon, Mich.
Gr. Hav. Rd.: F. H. May, *Manager*.Allegan, Mich.
Russell Booth, *M. M*....Muskegon, Mich.
Gr. Rap. Rd.: A. M. Nichols, *Supt*.Gr. Rapids, Mich
C. J. Howard, *M. M*....Grand Rapids, Mich.
Cincinnati, Columbus & Hocking Val. Ry.
4-9 g. 25 m. 1 lo. 27 cars.
J. E. Gimperling, *Gen. Man*....Dayton, O.
Geo. F. Robinson, *Supt*....Washington, O.
Cin., Georgetown & Portsmouth. 3 g. 35 m. 2 lo. 39 c.
A. T. Roever, *Gen. Man*....Cincinnati, O.
J. C. Homer, *M. M*....Cincinnati, O.
Cincinnati, Green Riv. & Nashville R. R. 3 g.
A. C. Sim, *Supt*....King's Mountain, Ky.
Cincinnati, Hamilton & Dayton R. R. (*See Ohio Ry.*)
Cincinnati, Indianapolis, St. Louis & Chicago Ry.
4-8½ g. 345 m. 60 lo. 1,930 cars.
J. W. Sherwood, *Supt*....Indianapolis, Ind.
Geo. Tozzer, *Pur. Agt*....Cincinnati, O.
J. S. Patterson, *M. of Mach. & M. C. B*.Cincinn., O.
Cincinnati, New Orleans & Texas Pacific Ry. Co.
5 g. 841 m. 96 lo. 2,687 cars.
John Scott, *V. Pres. & Gen. Man*..Cincinnati, O.
James Meehan, *Gen. M. M*....Ludlow, Ky
Cin. So. Div.: Cecil Fleming, *Gen. Supt*..Cin., O.
Julius Uihlein, *Pur. Agt*....Cincinnati, O.
Frank Allingham, *M. M*....Cincinnati, O.
Ala. Gr. S'n Div.: C. B. Wallace, *Gen. Supt*.. and
R. W. Healey, *Pur. Agt*....Chattanooga, Tenn.
A. Thomson, *M. M*....Chattanooga, Tenn.
Fred Morgan, *M. C. B*....Chattanooga, Tenn.
V. & M. Div.: E. F. Raworth, *G. S*.Vicksburg, Miss
James B. Browne, *M. M*....Vicksburg, Miss.
V. S. & P. Div.: F. Y. Dabney, *Supt*..Monroe, La.
W. Bell Smith, *M. M. & C. B*....Monroe, La.
Cincinnati Northern Ry. 3 g. 30 m. 4 lo. 60 c.
C. W. Bradley, *G. Man. & Pur. Agt*.Cincinnati, O.
T. J. Hamer, *M. M. & C. B*....Cincinnati, O.
Cincinnati South-Eastern Ry. 3 g. 17 m.
John V. Patton, *Supt*....Flemingsburg, Ky.
Cincinnati Southern Ry (*See Cin., N. O. & Tex. Pac.*)
Cincinnati, Van Wert & Mich. R. R. 4-8½ g. 22 m.
R. J. Cavett, *Supt*....Van Wert, O.
Cin., Wabash & Mich. Ry. 4-8½ g. 110 m. 8 lo. 139 c.
Norman Beckley, *Gen. Man. & P. A*.Elkhart, Ind.
O. W. Lamport, *Supt*....Wabash, Ind.
S. B. Tinker, *M. M. & M. C. B*....Wabash, Ind.
Cincinnati & Eastern Ry. 3 g. 62 m. 4 lo. 66 cars.
G. H. Wilber, *Gen. Supt*....Cincinnati, O.
Clarksburg, Weston & Glenville R. R.
3 g. 26 m. 2 lo. 21 cars.
E. M. Vandervoort, *Gen. Agt*...Weston, W. Va.
A. H. Kunst, *Supt*....Weston, W. Va.
Sam. A. Steel, *M. M*....Weston, W. Va.
Cleve., Col., Cin. & Indian'pl's Ry. (*See Ohio Ry.*)
Cleve., Akron & Col. R. R. 4-9 g. 144 m. 14 lo. 638 c.
N. Monsarrat, *Gen. Supt*....Akron, O.
M. M. & C. B....Akron, O.
Cleve., Painesv'le & Ash. 4-8½ g. 11 m. 3 lo. 22 cars.
Wm. E. Lewis, *Gen. Man*....Cleveland, O.
Cleveland & Pittsburg R. R. (*See Penna. Co.*)
Cleveland, Tuscarawas Valley & Wheeling Ry.
4-8½ g. 158 m. 23 lo. 1,522 cars.
Oscar Townsend, *Gen. Man*....Cleveland, O.
Wm. Thornburg, *Supt*....Cleveland, O.
W. A. Stone, *M. M*....Lorain, O.
Cleve. & Marietta R. R. 4-8½ g. 99 m. 9 lo. 157 cars.
S. C. Baldwin, *Gen. Man*....Marietta, O.
R. B. Hoover, *Pur. Agt*....Marietta, O.
Thos. Robertson, *M. M*....Marietta, O.
Coburg, Peterborough & Marmora Ry.
5-6 g. 47 m. 5 lo. 207 cars.
Jas. R. Barber, *Gen. Supt*....Coburg, Ont.
Columbia & Greenville R. R. (*See Rich. & Dan.*)
Columbus, Hocking Valley & Toledo Ry.
4-9 g. 319 m. 76 lo. 6,000 cars.
Orland Smith, *Gen. Man*....Columbus, O.
G. R. Carr, *Gen. Supt. & Pur. Agt*.Columbus, O.
J. G. Hutchins, *M. M*....Columbus, O.
J. M. Rockafield, *M. C. B*....Columbus, O.
Tol. Div.: M. T. Seymour, *Supt*....Columbus, O.
Hock. V. Div.: M. P. L. Booth, *Supt*.Columbus, O.
Ohio Riv. Div.: C. D. Norris, *Supt*....Logan, O.
Columbus & Maysville Ry. 3 g. 19 m.
G. H. Wilber, *Supt*....Batavia, O.
Columbus & Rome R. R. 3 g. 32 m. 2 lo. 25 cars.
M. E. Gray, *Supt*....Columbus, O.
Columbus & Western Ry. 5 g. 89 m. 2 lo. 19 cars.
E. A. Llewellen, *Gen. Man*....Columbus, Ga.
R. A. Bridges, *M. M*....Opelika, Ala.
Concord & Claremont R. R. (*See Northern of N. H.*)
Conn. Riv. and Ver. Val. R. Rs. 4-8½ g. 130 m. 33 lo. 456 c
J. Mulligan, *Supt. & Pur. Agt*.Springfield, Mass
W. H. Stearns, *M. M*....Springfield, Mass.
Robert Hitchcock, *M. C. B*...Springfield, Mass
Connotton Valley R. R. 3 g. 109 m. 10 lo. 531 cars.
C. G. Patterson, *Gen. Man*....Canton, O
W. N. Moffet, *Supt*....Canton, O
A. B. Proal, *Pur. Agt*....Canton, O.
E. W. Poorman, *M. M*....Canton, O.
Cooperstown & Susq. Val. 4-8½ g. 16 m. 2 lo. 13 cars.
Andrew Shaw, *Pres*....Cooperstown, N. Y.
Corning, Cowanasque & An. Ry. (*See Syr., G. & C.*)
Cornwall R. R., 4-8½ g. 9 m. 5 lo. 166 cars.
Frank Donahue, *Gen. Supt*....Lebanon, Pa.
Cotton Plant R. R. 3-6 g. 11 m.
Wm. Black, *Pres. & Gen. Man*...Brinkley, Ark.
Credit Valley Ry. 4-8½ g. 184 m. 22 lo. 484 cars.
James Ross, *Gen. Supt*....Toronto, Ont.
John Macnab, *Pur. Agt*....Toronto, Can.
H. G. Taylor, *Mech. Supt*....Toronto, Can.
Crown Point Iron Co. R. R. 3 g. 13 m.
J. M. Davies, *Supt*....Crown Point, N. Y.

CLIFF, RIGHTER & CO.,

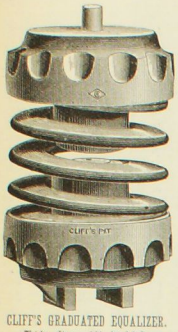
MANUFACTURERS OF

Railway Car Springs,

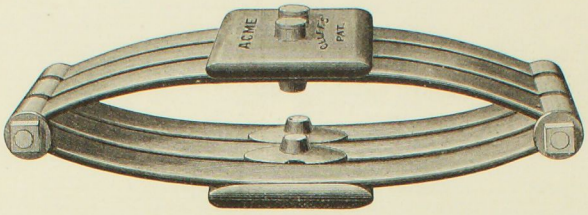
CLIFF BUFFER.
5½ by 8. 2¼ in. hole.
Capacity, 16,500 lbs.



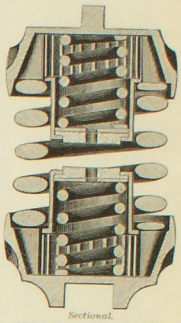
Sectional.
CLIFF BUFFER.
5½ x 8. 2¼ in. hole.
Capacity, 16,500 lbs.



CLIFF'S GRADUATED EQUALIZER.
7½ in. diam., 11¼ in. high.
Capacity graduated from 7,000 to 10,000 lbs.



ACME TRIPLET FREIGHT ELLIPTIC.
CLIFF'S PATENT, MARCH 29, 1881.
22 in. long. 6¼ a, b bearing to bearing.
Capacity, 28,500 lbs.



Sectional.
CLIFF'S GRADUATED EQUALIZER.
7½ in. diam. 11¼ in. high.
Capacity graduated from 7,000 to 10,000 lbs.

No. 5 DEY STREET, NEW YORK.

IN THE PATENT FIGHT

BETWEEN

D. A. HOPKINS, of 113 Liberty Street, N. Y.,

PATENTEE AND MANUFACTURER OF

SELF-FITTING JOURNAL BEARINGS,

AND

T. V. LE ROY,

A SECOND DECISION WAS RENDERED JUNE 7, 1881,

IN FAVOR OF HOPKINS.

The closing paragraphs of said decision read as follows:

"As the proofs stand, therefore, Hopkins was the first to conceive, the first to disclose to others, the first to embody models, the first to reduce to practice, and the first to apply for a patent. Le Roy was first to obtain a patent, but under circumstances which do not give him the prima facie case which a patent usually implies."

"We must find priority of invention to be with D. A. Hopkins, and affirm the examiner's decision."

H. H. BATES,
R. L. B. CLARKE,
R. G. DYRENFORTH,
Examiners-in-Chief.

WILSON, WALKER & CO.,

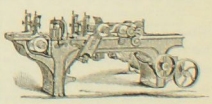
MANUFACTURERS OF ALL KINDS OF

RAILROAD CAR AND LOCOMOTIVE FORGINGS,

PITTSBURGH, PA.

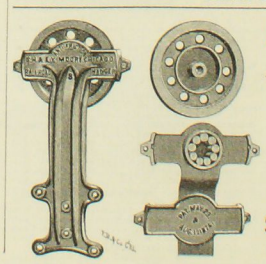
BLIND SHADE
Planing Machine FOR **CAR WORK.**
The most perfect Machine in use.

LEE'S PATENT
Molding Machines
Five different styles and sizes. These are especially adapted to all classes of car work.



HENRY A. LEE, Manuf'r, 164 Union St., Worcester, Mass.

PHOTO-ENGRAVING CO.
67-69 PARK PLACE
New York.
WESTERN BRANCH
180 DEARBORN ST. CHICAGO.
Engravings for Books and all Advertising purposes · Cheaper than any other Method ·



ANTI-FRICTION HANGERS

OF ALL SIZES, FOR

WAREHOUSE DOORS,
FREIGHT-HOUSE DOORS,
BAGGAGE-CAR DOORS,
FREIGHT-CAR DOORS,
STREET-CAR DOORS, ETC.

Send for Price List, Illustrated.

MANUFACTURED BY

S. H. & E. Y. MOORE,

163 & 165 LAKE STREET CHICAGO.

Cumberland & Maurice Riv. R. R. 4-8½ g. 22 m.
L. H. Dowdney, Supt ..... Port Norris, N. J.
Cumberland & Pennsylvania R. R. 4-8½ g. 55 m.
P. L. Burwell, Gen Supt & P A. Cumberland, Md.
N. W. Howson, Mast. of Mach. Mt. Savage, Md.
Nathan Binix, M. C. B. ..... Mt. Savage, Md.
Cumberland Valley R. R. 4-9 g. 125 m. 21 lo. 280 cars.
J. F. Boyd, Supt ..... Chambersburg, Pa.
O. N. Lull, Ch. En. & Pur. Agt. Chambersb'g, Pa.
A. S. Hull, M. M. ..... Chambersburg, Pa
G. W. Nitterhouse, M. C. B. Chambersburg, Pa

D

Danbury & Norwalk R. R. 4-8½ g. 33 m. 6 lo. 100 c.
L. W. Sandiforth, G. Supt. & P. A. S. Norwalk, Ct.
N. M. George, M. M. & C. B. ... Danbury, Conn.
Danville, Mocksville & So.-Wn. R. R. 3 g. 28 m.
H. W. Goodrich, Ch. Eng. ... Leakesvil'e, N. C.
Danville, Olney & O. Riv. R. R. 3 g. 110 m. 4 lo. 83 c.
C. Howard, G. Man. & Pur. Agt. Boston, Mass.
J. M. Graham, Supt ..... Kansas, Ill.
Louis Parisoe, M. M. & C. B. ..... Kansas, Ill.
Dayton & Union R. R. (See Ohio Ry.)
Delaware, Lackawanna & Western R. R.
4-8½ g. 670 m. 348 lo. 26,187 cars.
Wm. F. Halstead, Gen. Supt. ... Scranton, Pa.
G. W. B. Cushing, Pur. Agt. . New York, N. Y.
Walter Dawson, Mast. of Mach. ... Scranton, Pa.
Robt. McKenna, Mast. Car Rep. ... Scranton, Pa.
Bloomsb'g Div.: C. Graham, M. M. Kingston, Pa.
Utica Div.: A. C. Salisbury, Supt ... Utica, N. Y.
Thos. Thatcher, M. M. ..... Utica, N. Y.
Morris & Essex Div. and Sussex R. R.:
A. Reasoner, Supt ..... Hoboken, N. J.
W. H. Lewis, M. M. ..... Kingsland, N. J.
J. W. Baker, M. C. B. ..... Dover, N. J.
Oswego & Syracuse Div.:
W. B. Phelps, Supt ..... Oswego, N. Y.
Jas. Buchanan, M. M. .. Syracuse, N. Y.
Syracuse, Binghamton & New York R. R.
4-8½ g. 81 m. 20 lo. 598 cars.
W. K. Niver, Gen. Supt ..... Syracuse, N. Y.
Jas. Buchanan, M. M. ..... Syracuse, N. Y.
Delaware River R. R. 4-9 g. 20 m. 3 lo. 4 cars.
E. H. Green, Supt. & P. A. ... Pedricktown, N. J.
Delaware Western R. R. 4-8½ g. 20 m. 4 lo. 30 cars.
David Connell, Supt ..... Wilmington, Del.
Delaware & Chesapeake R. R. 4-8½ g. 54 m. 3 lo. 16 c.
O. S. Sanford, Supt ..... Oxford, Md.
Joseph A. Baynard, M. M. ..... Oxford, Md.
Delaware & Hudson Canal Co.
4-3 and 4-8½ g. 596 m. 151 lo. 9,248 cars.
C. F. Young, Gen. Man ..... Honesdale, Pa.
C. F. Young, Pur. Agt ..... Albany, N. Y.
R. C. Blackall, Supt. of Mach. ... Albany, N. Y.
Susq. Div.: C. D. Hammond, Supt. Albany, N. Y.
C. A. Jones, M. M. ..... Oneonta, N. Y.
J. R. Skinner, M. C. B. ..... Oneonta, N. Y.
Sar. & Ch. Divs.: T. Voorhees, Supt ... Troy, N. Y.
J. L. Corey, M. M. ..... Green Island, N. Y.
Chr. Korner, M. C. B. ..... Green Island, N. Y.
Pa. Div.: R. Manville, Supt. & Pur. Agt.; and
S. H. Dotterer, M. M. ... Carbondale, Pa.
T. Orchard, M. C. B. ..... Carbondale, Pa.
Denver & Rio Grande Ry. 3 g. 1,062 m. 170 lo. 4,617 c.
D. C. Dodge, Gen. Man. ..... Denver, Col.
Geo. W. Ristine, Asst. Gen. Man. .. Denver, Col.
A. B. Garner, Pur. Agt. Colorado Springs, Col.
G. W. Cushing, Gen. Supt ..... Denver, Col.
N. W. Sample, M. M. ..... Denver, Col.
1st Div.: M. C. Kimberly, Supt ... S. Pueblo, Col.
2d Div.: W. H. Bancroft, Supt. ... Alamosa, Col.
Gun'n Div.: J. A. Myers, Supt ... Salida, Col.
B. & E. Riv. Div.: C. Lydon, Supt. Leadville, Col.
San J. Div.: R. M. Ridgeway, Supt. Antonito, Col.
Des Moines & Ft. Dodge. 4-8½ g. 87 m. 11 lo. 158 c.
C. N. Gilmore, Supt ..... Des Moines, Ia.
John McGrayel, M. M. ..... Grand Junction, Ia.
E. A. Avery, M. C. B. ..... Grand Junction, Ia.
Det., Gr. H. & Mil. Ry. 4-8½ g. 189 m. 36 lo. 478 c.
John Barton, Asst. Man ..... Detroit, Mich.
John S. Lorimer, Storekeeper ... Detroit, Mich.
W. J. Morgan, Supt ..... Detroit, Mich.
F. Parker, M. M. ..... Detroit, Mich.
Det., Lansing & No'n R. R. 4-8½ g. 222 m. 34 lo. 1027 c.
John B. Mulliken, Gen. Man ..... Detroit, Mich.
Allan Bourn, Pur. Agt ..... Detroit, Mich.
Thos. M. Fish, Gen. Supt ..... Ionia, Mich.
G. C. Watrous, M. M. & C. B ..... Ionia, Mich.
Det., Mack. & Marq. R. R. 4-8½ g. 151 m. 8 lo. 227 c.
Thos. McKeown, Gen. Supt ... Marquette, Mich.
E. W. Allen, Pur. Agt ..... Marquette, Mich.
John Wilson, Mech. Supt ..... Marquette, Mich.
Dorchester & Delaware R. R. 4-8½ g. 33 m.
Thos. E. Wright, Supt ..... Cambridge, Md.
Dubuque & Dakota R. R. 4-8½ g. 64 m. 2 lo. 54 cars.
A. C. Goodrich, Supt ..... Waverly, Ia.
W. S. Couch, Pur. Agt ..... Dubuque, Ia.
Duck River Valley R. R. 3 g. 34 m.
Geo. Childress, Supt ..... Columbia, Tenn.
Dunkirk, Allegheny Valley & Pittsburgh R. R.
4-8½ g. 91 m. 14 lo. 102 cars.
D. Thayer, Gen. Supt ..... Dunkirk, N. Y.
R. C. Moore, Pur. Agt ..... New York, N. Y.
J. C. Haggett, M. M. & C. B. ... Dunkirk, N. Y.

E

East Alabama Ry. 5 g. 22 m. 3 lo. 12 cars.
W. W. Barnes, Supt ..... Opelika, Ala.
East Broad Top R. R. 3 g. 30 m. 6 lo. 191 cars.
A. W. Sims, Supt ..... Orbisonia, Pa.
G. A. Haggerty, M. M. ..... Orbisonia, Pa.
E. St. Louis & Carondelet Ry. 4-9 g. 12 m. 1 lo. 22 c.
Joseph Hill, Gen. Supt ..... East St. Louis, Mo.
East Tennessee, Virginia & Georgia R. R.
5 g. 1,185 m. 102 lo. 1,597 cars.
J. F. O'Brien, Gen. Supt ..... Knoxville, Tenn.
Main Stem: Ohio; and No. Car. Divs.:
F. K. Huger, Supt ..... Knoxville, Tenn.
B. J. Sitton, M. M. ..... Knoxville, Tenn.
Jos. Armbruster, M. C. B. ... Knoxville, Tenn.
Selma and Alabama Central Divs.:
John M. Bridges, Supt ..... Selma, Ala.
Simon Gay, M. M. ..... Selma, Ala.
W. W. Pierce, M. C. B. ..... Selma, Ala.
Memphis & Charleston R. R. (Div.):
R. B. Pegram, Jr., Supt ..... Memphis, Tenn.
H. N. Burford, M. M. ..... Memphis, Tenn.
J. J. Casey, M. C. B. ..... Memphis, Tenn.
Macon & Brunswick Div.:
J. M. Edwards, Supt ..... Macon, Ga.
C. E. Armstrong, Pur. Agt ..... Macon, Ga.
R. Wagnon, M. M. ..... Macon, Ga.
East Tenn. & W'n No. Car. R. R. 3 g. 15 m. 2 lo. 36 c.
Thomas E. Matson, Supt. .. Elizabethton, Tenn.
Eastern R. R. 4-8½ g. 283 m. 99 lo. 2,268 cars.
D. W. Sanborn, Mast. of Trans. Boston, Mass.
Geo. J. Fisher, Pur. Agt ..... Boston, Mass.
Amos Pillsbury, S. M. P. & M. .. E. Boston, Mass.
J. D. Billings, M. C. B. ..... Salem, Mass.
Con'y Div.: J. W. Sanborn, Supt., Wolfboro J., N. H.
Eastern Kentucky R. R. 4-8½ g. 34 m. 5 lo. 123 c.
H. W. Bates, V. P. & Manager ... Greenup, Ky.
Geo. Gibbs, Pur. Agt ..... Riverton, Ky.
D. S. Weaver, M. M. ..... Riverton, Ky.
Eastern Ohio R. R. 4-8½ g. 8 m. 1 lo. 2 cars.
W. H. Stevens, Gen. Supt ..... Cumberland, O.
Eastern Shore R. R. 4-8½ g. 38 m. 2 lo.
W. Thompson, Supt ..... Princess Anne, Md.
Elberton Air-Line R. R. 3 g. 50 m. 2 lo. 25 cars.
G. J. Foreacre, Gen. Man. & P. A. Atlanta, Ga.
Elgin Ry. 14 miles.
C. E. Hallett, Gen. Man ..... Sussex, N. B.
Elizabeth City & Norfolk R. R. 4-8½ g. 79 m. 5 lo. 96 c.
M. K. King, Gen. Man. & Pur. Agt. Norfolk, Va.
J. S. Whitworth, M. M. & C. B. ... Norfolk, Va.
Erie & Pittsburgh R. R. (See Penna. Co.)
Eureka & Palisade R. R. 3 g. 97 m. 7 lo. 124 cars.
P. Everts, Gen. Supt & Pur. Agt. Eureka, Nev.
J. P. Berg, M. M. ..... Palisade, Nev.
A. S. Longley, M. C. B. ..... Palisade, Nev.
Europ. & No. Amer. Ry. 4-8½ g. 114 m. 15 lo. 557 c.
F. W. Cram, Supt. & Pur. Agt ... Bangor, Me.
A. O. Bailey, M. M. & C. B. Mattawamkeag, Me.
Evansville, Paducah & Cairo Line. 200 miles.
G. J. Grammer, Supt ..... Evansville, Ind.
Evansville, Rockport & E'n Ry. 4-9 g. 71 m. 5 lo. 98 c.
H. L. Shepard, Supt ..... Evansville, Ind.
Evansv. & Terre Haute. 4-8½ g. 114 m. 26 lo. 900 c.
C. J. Hepburn, Gen. Supt ..... Evansville, Ind.
John Torrence, Gen. For ..... Evansville, Ind.

F

Fitchburg R. R. 4-8½ g. 180 m. 100 lo. 3,315 cars.
John Adams, Gen. Supt ..... Boston, Mass.
E. K. Turner, Asst. Supt ..... Fitchburg, Mass.
F. S. Pratt, Pur. Agt ..... Boston, Mass.
W. A. Foster, Acting Supt. M. P. & M.; and
J. W. Marden, M. C. B. ..... Charlestown, Mass.
Flint & Pere Marq. 4-8½ g. 318 m. 52 lo. 1,556 cars.
H. C. Potter, Gen. Man ..... E. Saginaw, Mich.
D. Edwards, Asst. Gen. Man. E. Saginaw, Mich.
G. G. Cook, Pur. Agt ..... E. Saginaw, Mich.
Sanford Keeler, Gen. Supt .. E. Saginaw, Mich.
W. F. Potter, Supt (E. Div.) .. E. Saginaw, Mich.
M. V. Meredith, Supt. (W. Div.) E. Saginaw, Mich.
T. J. Hatswell, M. M. ..... E. Saginaw, Mich.
R. McPherson, M. C. B. ..... E. Saginaw, Mich.
Florida Central R. R. 5 g. 59 m.
Wm. M. Davidson, Supt. & P. A. Jacksonville, Fla.
Jas. S. McElroy, M. M. & C. B. Jacksonville, Fla.
Florida Southern Ry. 3 g. 50 m. 5 lo. 53 cars.
N. R. Gruelle, Gen. Supt ..... Palatka, Fla.
F. A. Garrison, Pur. Agt ..... Palatka, Fla.
J. W. Roberts, M. M. & C. B. ... Palatka, Fla.
Florida Transit R. R.
D. E. Maxwell, Gen. Supt ..... Fernandina, Fla.
Fonda, Johnst'n & Gloversv. 4-8½ g. 26 m. 5 lo. 18 c.
Lawton Caten, Supt ..... Gloversville, N. Y.
Fond du Lac, Amboy & Peoria. 3 g. 30 m. 2 lo. 35 c.
Alonzo Kinyon, Supt. & P. A. Fond du Lac, Wis.
Fort Dodge & Fort Ridley R. R. 4-8½ g.
G. R. Pearson, Supt ..... Fort Dodge, Ia.
Ft. Madison & No.-West'n Ry. 3 g. 12 m. 1 lo. 21 c.
S. B. Kenrick, Supt. & Pur. Agt. Ft. Madison, Ia.
Ft. Wayne, Cin. & Louisv. 4-8½ g. 108 m. 9 lo. 249 c.
W. W. Worthington, Gen. Supt. Ft. Wayne, Ind.
Ft. Wayne & Jackson. 4-8½ g. 100 m. 10 lo. 353 c.
Gen. Supt. & P. A. ..... Jackson, Mich.
C. W. Hollister, M. M. & C. B. ... Jackson, Mich.
Frederickton Ry. 4-8½ g. 22 m. 2 lo. 22 cars.
F. B. Edgecomb, Supt ..... Frederickton, N. B.
Freehold & New York Ry. 4-9 g. 15 m. 3 lo. 40 c.
J. E. Ralph, Supt., P. A. & M. M. Keyport, N. J.
Chas. H. Snedeker, M. C. B. ... Freehold, N. J.
Fulton County N. G. Ry. 3 g. 47 m. 2 lo. 106 cars.
S. H. Mallory, Gen. Manager ... Lewiston, Ill.

G

Galveston, Harrisburg & San Antonio Ry.
4-8½ g. 382 m. 37 lo. 870 cars.
Jas. Converse, Gen. Supt ..... Houston, Tex.
Chas. Babbidge, Pur. Agt ..... Boston, Mass.
D. T. Davis, Supt. M. P. & M. Harrisburg, Tex.
James Alexander, M. C. B. .. Harrisburg, Tex.
El Paso Div. (See Cen. Pac.) 4-8½ g. 144 miles.
Galveston, Houston & Henderson R. R.
4-8½ g. 50 m. 17 lo. 212 cars.
W. H. Harding, Gen. Man ..... Galveston, Tex.
Allen McCoy, Supt ..... Galveston, Tex.
J. G. Conlon, M. M. ..... Galveston, Tex.
Geneva, Ithaca & Sayre R. R. (See Lehigh Val.)
Georgia R. R. 5 g. 307 m. 42 lo. 938 cars.
John W. Green, Gen. Man ..... Augusta, Ga.
John S. Cook, M. M. ..... Augusta, Ga.
T. M. Preval, M. C. B. ..... Augusta, Ga.
Georgia Pacific Ry. (Miss. Div.). 3 g. 43 m. 2 lo. 44 c.
C. M. Bolton, Supt ..... Greenville, Miss.
Grand Haven R. R. (See Chic. & W. Mich.)
Grand Junction R'y. (See Midland of Can.)
G'd Rap., Newaygo & L. S. R. R. (See Chic. & W. M.)
Grand Rapids & Indiana. 4-8½ g. 456 m. 46 lo. 1,566 c.
W. O. Hughart, Pres ..... Grand Rapids, Mich.
W. R. Shelby, Pur. Agt ... Grand Rapids, Mich.
S. D. Bradley, M. M. ..... Grand Rapids, Mich.
No'n Div.: J. M. Metheany, Supt. G'nd Rap., Mich.
So'n Div.: P. S. O'Rourke, Supt. Fort Wayne, Ind.
Grand Tower & Carbondale. 4-8½ g. 25 m. 6 lo. 357 c.
T. M. Williamson, Supt. & P. A. Gr. Tower, Ill.
Hugh Smith, M. M. & C. B. ... Grand Tower, Ill.
Grand Trunk Ry. 4-8½ g. 1,267 m. 434 lo. 9,403 c.
Joseph Hickson, Gen. Man. ... Montreal, Can.
Wm. Wainright, Asst. Gen. Man. Montreal, Can.
Gr. Tr. Divs: W. J. Spicer, Supt. Montreal, Can.
Jno. Taylor, Gen. Storekeeper. Montreal, Can.
Herbert Wallis, Mech. Supt. .. Montreal, Can.
Wm. McWood, M. C. B. ..... Montreal, Can.
F. R. F. Brown, Asst. M. S. ... Montreal, Can.
J. Davis Barnett, Asst. M. S. ... Stratford, Ont.
Chi. & Gr. Trunk Ry. 4-8½ g. 330 m. 56 lo. 1,191 c.
S. R. Callaway, Gen. Man ..... Chicago, Ill.
N. Wall, Pur. Agt ..... Fort Gratiot, Mich.
H. Roberts, Mech. Supt ... Port Huron, Mich.
Great Western Ry. 4-8½ g. 823 m. 216 lo. 5,039 c.
F. Broughton, Gen. Man ..... Hamilton, Ont.
Chas. Stiff, Supt ..... Hamilton, Ont.
G. R. Nash, Storekeeper ..... London, Ont.
C. K. Domville, Loco. Supt ..... Hamilton, Ont.
C. F. Hanson, M. M. ..... London, Ont.
Henry Childs, Car Supt ..... London, Ont.
Green Bay, Winona & St. Paul R. R.
4-8½ g. 218 m. lo. 599 cars.
Timothy Case, V. P., Gen. Man. Green Bay, Wis.
James S. Mott, Pur. Agt ..... Green Bay, Wis.
Edw. Osborne, M. M. ..... Ft. Howard, Wis.
Greenwich & Johnsonville Ry. 4-8½ g. 15 miles.
J. H. Thompson, Supt ..... Greenwich, N. Y.
Gulf, Col. & Santa Fé Ry. 4-8½ g. 303 m. 15 lo. 430 c.
John Sealy, Gen. Man ..... Galveston, Texas.
F. P. Killeen, Asst. Gen. Man. & Pur. Agt. do.
G. B. Nichols, M. M. ..... Galveston, Texas.
W. H. Martin, M. C. B. ..... Galveston, Texas.
Gulf, W'n Texas & Pac. Ry. 4-8½ g. 68 m. 6 lo. 70 c.
M. D. Monserrate, Pr. & Supt ... Cuero, Texas.
James Mooney, M. M. ..... Cuero, Texas.

H

Halifax & Cape Breton Ry. 4-8½ g. 79 m. 5 lo. 237 c.
H. Abbott, Manager ..... New Glasgow, N. S.
Hannibal & St. Jo. R. R. 4-8½ g. 292 m. 78 lo. 1,860 c.
John B. Carson, Gen. Man ..... Hannibal, Mo.
W. R. Woodard, Supt ..... Hannibal, Mo.
T. L. Dunn, Ch. Eng. & Pur. Agt. Hannibal, Mo.
Jas. Long, Supt. M. P. & Car Dep. Hannibal, Mo.
Hanover Branch Ry. 4-8½ g. 8 m. 2 lo. 18 cars.
E. Y. Perry, Pres ..... So. Hanover, Mass.
Hanover Junction, Hanover & Gettysburg R. R.
4-8½ g. 74 m. 9 lo. 106 cars.
H. A. Young, Gen. Supt ..... Hanover, Pa.
John J. Bingley, M. M. ..... Hanover, Pa.
Harrisburg & Potomac R. R. 4-8½ g. 27 m. 2 lo. 7 c.
R. H. Middleton, Supt ..... Boiling Springs, Pa.
Hartford & Conn. Val. R. R. 4-8½ g. 45 m. 7 lo. 196 c.
Samuel Babcock, Pr. & Supt ..... Hartford, Ct.
Hartford & Conn. W'n R. R. 4-8½ g. 69 m. 10 lo. 235 c.
John F. Jones, Supt ..... Hartford, Ct.
J. C. Barton, M. M. ..... Hartford, Ct.
Hartwell R. R. 3 g. 10 m. 1 lo. 3 cars.
E. B. Benson, Supt ..... Hartwell, Ga.
Housatonic R. R. 4-8½ g. 126 m. 22 lo. 495 cars.
L. B. Stillson, Supt ..... Bridgeport, Ct.
D. S. Draper, Pur. Agt ..... Bridgeport, Ct.
N. Slingland, M. M. ..... Falls Village, Ct.
J. J. Ferris, M. C. B. ..... Falls Village, Ct.
Houston Belt Ry. 4-8½ and 3 gauge. 50 miles.
S. L. Werden, V. P. & Gen. Man. Houston, Tex.
Houston, East & West Tex. Ry. 3 g. 88 m. 6 lo. 224 c.
E. L. Bremond, Gen. Man ..... Houston, Tex.
Paul Bremond, Pur. Agt ..... Houston, Tex.
A. Riggs, M. M. ..... Houston, Tex.
Houston & Tex. Cen. Ry. 4-8½ g. 799 m. 78 lo. 2,350 c.
G. Jordan, V. Pr. & Gen. Man ... Houston, Tex.
A. H. Swanson, Gen. Supt ..... Houston, Tex.
E. S. Larcher, Pur. Agt ..... New York, N. Y.
L. C. Noble, Gen. M. M. ..... Houston, Tex.
James McGee, M. C. B. ..... Houston, Tex.
So. & Wn. Divs.: M. G. Howe, Supt. Houston, Tex.
No. & Mi. Divs.: G. A. Quinlan, Supt., and
C. H. Burns, Asst. M. M. ..... Corsicana, Tex.
No.-Wn. Div.: Donald Allen, Supt ... Waco, Tex.
F. O. Wyatt, Gen. Man ..... Clarinda, Ia.
Humeston & Shenandoah R. R.
4-8½ g. 85 m. 5 lo. 72 cars.
Huntingdon & Br. Top Mt. 4-8½ g. 62 m. 18 lo. 69 c.
Geo. F. Gage, Gen. Supt ..... Huntingdon, Pa.
Samuel B. Knight, Pur. Agt. Philadelphia, Pa.
William Barkla, M. M. ..... Saxton, Pa.

I

Illinois Central R. R. 4-8½ g. 1,320 m. 224 lo. 6,172 c.
E. T. Jeffery, Gen. Supt ..... Chicago, Ill.
C. A. Beck, Asst. Gen. Supt ..... Chicago, Ill.
O. Ott, Pur. Agt ..... Chicago, Ill.
S. J. Hayes, Supt. of Mach ..... Chicago, Ill.
W. B. Snow, M. M. Car Works ..... Chicago, Ill.
Chic. Div.: T. J. Hudson, Supt ..... Cairo, Ill.
Henry Schlacks, M. M. ..... Chicago, Ill.
Mid. Div.: H. L. Frisbie, Supt ..... Pontiac, Ill.
Spring Div.: W. Wilkinson, Supt. Springfield, Ill.
W. B. McKenna, M. M. ..... Clinton, Ill.
No'n Div.: J. C. Jacobs, Supt ..... Amboy, Ill.
J. B. Edams, M. M. ..... Amboy, Ill.
Ia. Div.: D. W. Parker, Supt ..... Dubuque, Ia.
Thos. W. Place, M. M. ..... Waterloo, Ia.
Illinois Midland Ry. 4-8½ g. 176 m. 12 lo. 611 cars.
L. Genis, Rec. & Gen. Man ... Terre Haute, Ind.
E. D. Frost, Gen. Supt ..... Terre Haute, Ind.
J. G. Clifford, M. M. ..... Terre Haute, Ind.
Illinois & St. Louis R. R. 4-8½ g. 18 m. 5 lo. 402 c.
C. H. Sharman, Gen. Supt. & P. A. Belleville, Ill.
E. Hockett, M. M. ..... Belleville, Ill.
Charles Rotha, M. C. B. ..... E. St. Louis, Ill.
Indiana, Bloomington & Western Ry.
4-8¾ g. 673 m. 97 lo. 3,451 cars.
C. E. Henderson, Gen. Man. Indianapolis, Ind.
H. C. Norton, Pur. Agt ..... Indianapolis, Ind.
B. Warren, M. M. & C. B. ..... Urbana, Ill.
Peoria Div.: I. H. Wilson, Supt. Indianapolis, Ind.
St. Louis Div.: F. L. Peck, Act. Supt. Indnpls, Ind.
P. Leeds, Supt. Mo. Po. ... Indianapolis, Ind.
Ohio Div.: D. W. C. Brown, Supt ... Sandusky, O.
Jos. S. Porter, M. M. ..... Sandusky, O.
Ohio So'n Rd.: Ford Woods, Supt. Springfield, O.
G. A. Barnes, Pur. Agt ..... Springfield, O.
J. L. Brown, M. M. ..... Springfield, O.
Indiana, Illinois & Iowa R. R. 42 miles.
F. M. Drake, Gen. Man ..... Dwight, Ill.
Indianapolis & St. Louis R. R. (See Ohio Ry.)
Indianapolis & Vincennes R. R. (See Penna. Co.)
Intercolonial Ry. 4-8½ g. 846 m. 111 lo. 3,223 cars.
David Pottinger, Chief Supt ..... Moncton, N. B.
T. V. Cooke, Gen. Storekeeper .. Moncton, N. B.
H. A. Whitney, Mech. Supt ..... Moncton, N. B.
Ewd. Shaffer, M. C. B. ..... Moncton, N. B.
Monc. Div.: James E. Price, Supt. Moncton, N. B.
Hal. & St. J. Div.: Jas. Coleman, Supt. Truro, N. B.
No'n Div.: M. Busby, Supt ..... Cambellton, N. B.
Levis Div.: M. McDonald, Supt. Rivière du Loup, Q.
International Ry. 4-8½ g. 69 m. 2 lo. 12 cars.
International & Gt. N'n R. R. (See St. L., I. M. & S.)
D. E. McFee, Supt ..... Sherbrooke, Que.
Iowa Eastern R. R. 3 g. 19 m. 1 lo. 32 cars.
H. H. Kerr, Supt ..... Beulah, Ia.
Iron R. R. 4-10 g. 16 m. 5 lo. 187 cars.
Charles Campbell, Pr ..... Ironton, O.
Perry Scott, M. M. ..... Ironton, O.
Clem. Roetling, M. C. B. ..... Ironton, O.
Iron Mountain & Helena R. R. 4-8½ g. 27 m. 2 lo. 11 c.
Wm. Bailey, Pres. & Gen. Man ... Helena, Ark.
D. Stillinger, Supt ..... Helena, Ark.
F. M. Green, Pur. Agt ..... Helena, Ark.
Ithaca, Auburn & Western R. R. 4-8½ g. 38 m.
Fred T. Peet, Supt ..... Auburn, N. Y.

J

Jacksonville So.-E'n R. R. 4-8½ g. 54 m. 5 lo. 68 c.
E. S. Greenleaf, Supt ..... Jacksonville, Ill.
Ira Petrie, M. M. ..... Jacksonville, Ill.
Jacksonv., Pensacola & Mob. 5 g. 175 m. 11 lo. 102 c.
J. P. Laird, Supt. & M. M. ..... Tallahasse, Fla.
Jamesville & Washington. 4-8½ g. 22 m. 3 lo. 24 c.
A. Fisher, Manager ..... Dymond City, N. C.
J. E. Lordley, M. M. & C. B. .. Dymond City, N. C.
Jeffersonv'l, Madison & Indpls. R. R. (See Pa. Co.)
Jersey City & Albany R. R. 4-8½ g. 38 m.
J. W. McCulloh, Manager ... Jersey City, N. J.
Junction & Breakwater; Breakwater & Frankford; and Worcester R. Rs. 4-8½ g. 101 m. 6 l. 133 c.
J. & B. Rd.: Thos. Groome, Supt ..... Lewes, Del.
J. A. Maguire, M. M. ..... Lewes, Del.
B. & F. and W. Rds.: J. L. Mapes, St. Berlin, Md.

K

Kansas Central R. R. 3 g. 150 m.
Wm. T. Kelley, Supt. & Pur. Agt.; and
Wm. McCall, M. M. ..... Leavenworth, Kan.
W. S. Roach, M. C. B. ..... Leavenworth, Kan.
Kansas City, Fort Scott & Gulf R. R.; and
Kansas City, Lawrence & Southern Kansas R. Rs.
4-8½ g. 729 m. 62 lo. 1,700 cars.
Geo. H. Nettleton, Gen. Man. Kansas City, Mo.
L. W. Towne, Gen. Supt ..... Kansas City, Mo.
H. P. Jacques, Pur. Agt ..... Kansas City, Mo.
J. L. Barnes, Supt ..... Kansas City, Mo.
J. S. McCrum, M. M. ..... Kansas City, Mo.
A. N. Montier, M. C. B. ..... Kansas City, Mo.
Kansas City, St. Joseph & Council Bluffs; and St. Jo. & Des Moines R. Rs. 4-8½ g. 368 m. 38 lo. 1,148 cars.
J. F. Barnard, Gen. Supt. & P. A. St. Joseph, Mo.
F. A. Chase, M. M. ..... St. Joseph, Mo.
Thos. Aylesbury, M. C. B. ..... St. Joseph, Mo.
Kendall & Eldred R. R. (See Olean, B. & W.)
Kent Co.; Sm. & Del. Bay Rds. 4-8½ g. 50 m. 2 c.
Fred Gerker, Gen. Man ..... Chestertown, Md.
Kentucky Central R. R. 5 g. 148 m. 19 lo. 371 cars.
J. D. Ellison, Gen. Man ..... Covington, Ky.
J. H. Setchel, Supt. of Trans. & Mo. Po. do.
J. L. Hackathorn, M. C. B. ..... Covington, Ky.
Kentucky & South Atlantic Ry. 3 g. 3 lo. 52 c.
Geo. B. Harper, Supt. & P. A. Mt. Sterling, Ky.
S. P. Hatfield, M. M. ..... Mt. Sterling, Ky.
Kinzua R. R. (See Olean, B. & W.)
Kingston & Pembroke Ry. 4-8½ g. 65 m. 4 lo. 76 c.
B. W. Folger, Supt ..... Kingston, Can.
Wm. Harty, Pur. Agt ..... Kingston, Can.
Knox & Lincoln R. R. 4-8½ g. 49 m. 5 lo. 95 cars.
C. A. Coombs, Supt ..... Bath, Me.
Wm. A. Field, M. M. ..... Bath, Me.
C. L. Turner, M. C. B. ..... Bath, Me.
Knoxville & Augusta R. R. 4-6 g. 16 m. 2 lo. 34 cars.
J. M. Hood, Supt ..... Marysville, Tenn.

L

Lake Erie & Western Ry. 4-8½ g. 362 m. 35 l. 1,526 c.
E. H. Waldron, Gen. Man ..... La Fayette, Ind.
E. H. Andress, Pur. Agt ..... La Fayette, Ind.
H. L. Cooper, Supt. of Equipment ... Lima, O.
Sandusky Div.: D. S. Hill, Supt ..... Fremont, O.
Bloom. Div.: J. B. Clark, Supt. .. La Fayette, Ind.
Lake George & Muskegon Riv. 4-8½ g. 21 m. 4 lo. 75 c.
W. S. Gerrish, Gen. Man ..... Muskegon, Mich.
Lake Ontario So'n Ry. 4-8½ g. 34 m. 3 lo. 40 cars.
Jas. E. Briggs, Gen. Man ..... Newark, N. Y.
Geo. Thompson, M. M. ..... Sodus Point, N. Y.
Wm. Currier, M. C. B. ..... Sodus Point, N. Y.
Lake Shore & Michigan So'n Ry.
4-8½ g. 1,243 m. 496 lo. 13,665 cars.
John Newell, Gen. Man ..... Chicago, Ill.
P. P. Wright, Gen. Supt ..... Cleveland, O.
A. C. Armstrong, Pur. Agt ..... Cleveland, O.
James Sedgley, Gen. M. M. ..... Cleveland, O.
John Kirby, Gen. M. C. B. ..... Cleveland, O.
Buffalo Div.: C. B. Couch, Supt ..... Cleveland, O.
J. S. Graham, M. M. ..... Buffalo, N. Y.
A. C. Robson, M. C. B. ..... Buffalo, N. Y.
Frank. Div.: G. H. McIntire, Supt. Stoneboro, Pa.
Erie Div.: C. B. Couch, Supt ..... Cleveland, O.
L. O. Gassett, M. M. ..... Cleveland, O.
J. Withycombe, M. C. B. ..... Cleveland, O.
Toledo Div.: Thos. Flesher, Jr., Supt. Cleveland, O.
J. M. Sanborn, M. M. ..... Norwalk, O.
W. O. Smith, M. C. B. ..... Norwalk, O.
Mich. Div.: J. E. Curtis, Supt ..... Toledo, O.
Det. Div.: T. J. Charlesworth, Supt. Detroit, Mich.
Lansing Div.: W. H. Caniff, Supt. .. Lansing, Mich.
Western Div.: J. H. Parsons, Supt ... Chicago, Ill.
G. W. Stevens, M. M. (M. S. Divs.) Elkhart, Ind.
Frank O. Bray, M. C. B. ..... Adrian, Mich.
Laurel Fork & Sand Hill R. R. 4-8½ g. 6 m. 2 lo. 4 c.
D. C. Mudge, Supt ..... Parkersburg, W. Va.
Lebanon Springs R. R. 4-8½ g.
W. C. Alstyne, Manager ..... Albany, N. Y.
Lehigh Valley R. R. 4-8½ g. 545 m. 315 lo. 31,947 c.
Robt. H. Sayre, Gen. Supt ..... Bethlehem, Pa.
H. S. Goodwin, Asst. Gen. Supt. Bethlehem, Pa.
L. Chamberlain, Pur. Agt ... Philadelphia, Pa.
John S. Lentz, M. C. B. ..... Packerton, Pa.
N. J. Div.: John I. Kinsey, M. M. .. So. Easton, Pa.
Coal Rds.: J. I. Blakeslee, Supt. Mauch Chunk, Pa.
P. Hofecker, M. M. ..... Weatherly, Pa.
John Campbell, M. M. ..... Delano, Pa.
B. M. Div.: A. G. Brodhead, S. Mauch Chunk, Pa.
D. Clark, M. M. ..... Hazleton, Pa.
Wy. Div.: A. Mitchell, S. & M. M. Wilkesbarre, Pa.
Pa. & N. Y.; and Geneva, Ithaca & Sayre R. Rs.
Wm. Stevenson, Supt ..... Sayre, Pa.
J. N. Weaver, M. M. ..... Waverley, Pa.
Levis & Kennebec Ry. 4-8½ g. 45 m.
Robert Smith, Manager ..... Levis, Quebec.
Ligonier Valley R. R. 3 g. 11 m. 2 lo. 22 cars.
Thos. A. Mellon, Gen. Manager. East Liberty, Pa.
Little Rock, Miss. River & Texas Ry.
4-8½ g. 160 m. 12 lo. 260 cars.
J. A. Woodson, G. S. & P. A. Little Rock, Ark.
F. F. Hufsmith, M. M. & C. B. Arkansas City, Ark.
Little Rock & Fort Smith. 4-8½ g. 168 m. 12 lo. 353 c.
T. Hartman, Gen. Supt ..... Little Rock, Ark.
James Eblin, M. M. ..... Argenta, Ark.
James Malone, M. C. B. ..... Argenta, Ark.
Long Island R. R. 4-8½ g. 325 m. 79 lo. 740 cars.
I. D. Barton, Supt ..... Long Island City, N. Y.
Benj. Norton, Pur. Agt. Long Island City, N. Y.
C. A. Thompson, M. M. & C. B. do.
Long View & Sabine Val. Ry. 3 g. 12 m. 1 lo. 10 cars.
B. Barner, Pr. & Gen. Supt ... Long View, Tex.
Louisiana Western R. R. (See Tex. & N. O.)
Louisville, New Albany & Chicago Ry.
4-8½ g. 289 miles 33 lo. 2,800 cars.
John MacLeod, Gen. Supt ..... Louisville, Ky.
Wm. M. Lewis, Pur. Agt ..... Louisville, Ky.
Josiah Beitis, M. M. & C. B. ... New Albany, Ind.
Louis. N. Albany & St. L. Ry. 4-8½ g. 254 m. 2 lo. 20 c.
St. J. Boyle, V. Pr. & Gen. Man. Louisville, Ky.
R. G. Butler, Gen. Supt ..... Louisville, Ky.
C. F. Martin, Pur. Agt ..... Louisville, Ky.
F. M. Mast, M. M. ..... Evansville, Ind.
Louisville & Nashville R. R.
5 g. 2,072 m. 316 lo. 6,131 cars.
Fred. de Funiak, Gen. Man ..... Louisville, Ky.
G. C. Breed, A. Gen. Man. & Pur. Agt. do.
D. W. C. Rowland, Gen. Supt. Trans. do.
Reuben Wells, Supt. Mach ..... Louisville, Ky.
Louisv. Divs.; and Louisv., Cin. & Lex. Ry. (Cin. Div.)
J. G. Metcalf, Supt ..... Louisville, Ky.
A. Middleton, M. M. (Lo. Div.). Louisville, Ky.
J. W. Luttrell, M. M. (Cin. Div.) Louisville, Ky.
W. P. Pike, M. M. (2d & C. Div.) Bowling Green, Ky.
Nash. & D. Div.: J. Geddes, Supt. Nashville, Tenn.
W. H. Thomas, M. M. ..... Nashville, Tenn.
S. & N. A. Div.: E. Marsh, Supt. Birmingham, Ala.
C. W. White, M. M. ..... Birmingham, Ala.
Mob. & M.; N. Div. Pens. & Sel.; Sl. & Mont. R. Rs.:
M. S. Belknap, Supt ..... Montgomery, Ala.
J. N. Hall, M. M. (Mont. Shops) Montgomery, Ala.
N. O. Div.: J. T. Harrihan, Supt. New Orleans, La.
Wm. Adair, M. M. ..... Mobile, Ala.
Memp. Div.: W. Colcamp, Supt. Memphis, Tenn.
J. V. Slusser, M. M. ..... Memphis, Tenn.
St. L. Div.: J. Montgomery, Supt. Evansville, Ind.
Thos. Walsh, M. M. ..... Mt. Vernon, Ill.
Pensacola and So. Div. Pens. & Selma Rds.:
E. O. Saltmarsh, Supt ..... Pensacola, Fla.
Louisville & Wadley R. R. 5 g. 10 m.
J. H. Wilkins, Pr. & Supt ..... Louisville, Ga.

M

Maine Central R. R. 4-8½ g. 355 m. 58 lo. 1,335 c.
Payson Tucker, Supt ..... Portland, Me.
Ira K. Russell, For. Mach. Sh. .. Waterville, Me.
C. H. Kenison, For. Car Sh ..... Augusta, Me.
Manchester & Keene R. R. (See B. L. & C.)
B. F. George, Asst. Supt ..... Keene, N. H.
Manhattan Ry. 4-8½ g. 32 m. 203 lo. 596 pass. c.
Frank K. Hain, Gen. Man ..... New York, N. Y.
James Tobin, Pur. Agt ..... New York, N. Y.
C. L. Green, Supt ..... New York, N. Y.
T. W. Peeples, M. M. ..... New York, N. Y.
H. A. Webster, M. C. B. ..... New York, N. Y.
Marietta & Cin. R. R. 4-8½ g. 312 m. 65 lo. 1,422 c.
Jas. H. Stewart, Supt ..... Cincinnati, O.
E. Bosley, M. M. ..... Chillicothe, O.
Marietta & North Georgia R. R. 3 g. 24 m. 1 lo. 5 c.
Wm. Phillips, Pres ..... Marietta, Ga.
E. A. Withers, M. M. ..... Marietta, Ga.
Marquette, Houghton & Ontonagon R. R.
4-8½ g. 87 m. 30 lo. 2,074 cars.
Samuel Schoch, Gen. Man ..... Marquette, Mich.
R. M. McCauley, Pur. Agt ..... Marquette, Mich.
W. H. Williams, M. M. ..... Marquette, Mich.
H. D. Lyons, M. C. B. ..... Marquette, Mich.
Massachusetts Central R. R.
N. C. Munson, Gen. Man ..... Boston, Mass.
E. G. Allen, Supt ..... Boston, Mass.
S. H. Munson, Supt. M. P. ..... Boston, Mass.
McKean & Buffalo R. R. 4-8½ g. 22 m. 2 lo. 8 cars.
S. G. Godden, Supt ..... Smethport, Pa.
Memphis & Charleston R. R. (See E. Tenn. Va. & Ga.)
Memphis & Lit. Rock R. R. 5 g. 135 m. 14 lo. 272 c.
E. K. Sibley, G. Man. & P. A. Little Rock, Ark.
Wm. E. Smith, Supt ..... Memphis, Tenn.
Thos. Rennell, M. M. ..... Argenta, Ark.
P. Twitchell, M. C. B. ..... Argenta, Ark.
Mexican National Ry. (See Tex.-Mex.)
Michigan Cen. R. R. 4-8½ g. 958 m. 233 lo. 6,552 c.
H. B. Ledyard, Gen. Man ..... Detroit, Mich.
E. C. Brown, Asst. Gen. Supt ... Jackson, Mich.
Allan Bourn, Pur. Agt ..... Detroit, Mich.
S. H. Edgerly, Gen. M. M. ..... Jackson, Mich.
Robert Miller, Gen. M. C. B. ..... Detroit, Mich.
Bay City, Saginaw & Mackinaw Divisions.:
W. A. Vaughan, Supt ..... Bay City, Mich.
R. P. Baillie, M. M. ..... Bay City, Mich.
Main Line: Gr. Rap.; So. Bend; and So. Hav. Divs.:
C. B. Bush, Supt ..... Jackson, Mich.
W'n Divs.: R. H. L'Hommedieu, Supt. Chicago, Ill.
Middleburg & Schoharie; and
Schoharie Valley R. Rs. 4-8½ g. 10 m. 2 lo. 4 cars.
S. S. Danforth, Gen. Supt ... Middleburg, N. Y.
Middleton & Crawford R. R. 4-8½ g. 13 m. 1 lo. 5 c.
D. Thompson, Supt ... Thompson Ridge, N. Y.
Midland; Whitby, Port Perry & Lindsay; Grand Junc.; and Victoria Rys. 4-8½ g. 333 m. 25 lo. 800 c.
James Holden, Gen. Man ..... Whitby, Ont.
M. & G. J. Rys.: W. B. Ferguson, Gen. Supt. and
C. H. Craft, G. Pur. Agt ..... Port Hope, Ont.
Wm. Marling, Mech. Supt ..... Port Hope, Ont.
Edward Douglas, M. C. B. ... Port Hope, Ont.
Wm. Polson, M. M. (G. J. Ry.) Belleville, Ont.
W. P. P. & L. Ry., J. J. Ross, Supt. Whitby, Ont.
Vic. Ry.: T. B. Tate, Man. ..... Toronto, Ont.
F. B. Polsor, M. M. ..... Lindsay, Ont.
H. H. Harry, M. C. B. ..... Lindsay, Ont.
Midland No. Car. Ry. 4-8½ g. 95 m. 9 lo. 54 cars.
J. W. Andrews, Supt ..... Newbern, N. C.
B. Manly, Supt. of Mach ..... Newbern, N. C.
Milton & Sutherlin N. G. R. R. 3 g. 7 m. 1 lo. 5 cars.
W. T. Sutherlin, Pres ..... Danville, Va.
Milwaukee, Lake Shore & Western Ry.
4-8½ g. 250 m. 28 lo. 809 cars.
H. G. H. Reed, Supt ..... Milwaukee, Wis.
Chas. S. Hayden, Asst. Supt ... Manitowoc, Wis.
David B. Curtis, Asst. Supt .. Oshkosh, Wis.
S. Charnley, M. M. ..... Manitowoc, Wis.
Mineral Range R. R. 3 g. 13 m. 4 lo. 42 cars.
Chas. E. Holland, Pr. & Supt ... Hancock, Mich.
W. H. Carr, Pur. Agt ..... Hancock, Mich.
T. J. Shellhorn, M. M. & C. B. .. Hancock, Mich.
Minneapolis, Lyndale & Minnetonka Ry.
3 g. 20 m. 2 lo. 2 motors 39 cars.
Wm. McCrory, Supt. & Pur. Agt., and
R. Curtis, M. M. ..... Minneapolis, Minn.
Minneapolis & St. L. Ry. 4-8½ g. 506 m. 60 lo. 1,850 c.
C. H. Hudson, Gen. Man ..... Minneapolis, Minn.
E. Ryder, Supt ..... Minneapolis, Minn.
H. A. Towne, Supt. of Mech. Minneapolis, Minn.
Missisquoi R. R. 4-8½ g. 28 m. 1 lo. 2 cars.
W. C. Smith, Manager ..... St. Albans, Vt.
Mississippi Val. & Ship Island. 3-6 g. 20 m. 2 lo. 20 c.
A. L. Jaquith, Supt. & Pur. Agt. Vicksburg, Miss.
Peyton Harrison, M. M. ..... Vicksburg, Miss.

Mississippi & Tenn. R. R. 5 g. 101 m. 11 lo. 194 c
M. Burke, Supt ... Memphis, Tenn.
J. C. Ramsey, M. M ... Memphis, Tenn.
S. J. Bolton, M. C. B ... Memphis, Tenn.
Missouri Pacific Ry. 4-8½ g. 2,132 m. 293 lo. 8,035 c.
A. A. Talmage, Gen. Man ... St. Louis, Mo.
A. W. Dickinson, Asst. Gen. Supt. St. Louis, Mo.
R. B. Lyle, Pur. Agt ... St. Louis, Mo.
John Hewitt, Supt. Mach ... St. Louis, Mo.
John Hodge, M. C. B ... St. Louis, Mo.
Main Line, Warder Cumming, Supt. Sedalia, Mo.
C. L. Dunham, Supt. W'n ... Kansas City, Mo
R. D. Grant, M. M ... St. Louis, Mo.
Geo. Walshe, M. M ... Sedalia, Mo.
Ks. & Tex. Div., J. M. Ea... t ... Sedalia, Mo.
Wm. T. Small, M. M ... Parsons, Kan.
Dallas, Ex., L. L. Keller, Supt ... Dallas, Tex.
Cen. Br. Div., W. W. Fagan, Supt. Atchison, Kan.
H. V. Faries, M. M ... Atchison, Kan.
Mobile & Ala. Grand Trunk R. R. 5 g. 59 m. 2 lo. 23 c.
Wm. H. Pratt, Trustee ... Mobile, Ala.
Mobile & Girard R. R. 5 g. 84 m. 5 lo. 80 cars.
W. L. Clark, Gen Supt ... Columbus, Ga.
J. C. Albrecht, M. M ... Columbus, Ga.
A. J. Nix, M. C. B ... Columbus, Ga.
Mobile & Ohio R. R. 5 g. 528 m. 75 lo. 1,180 cars.
A. L. Rives, V. Pr. & Gen. Man ... Mobile, Ala.
R. H. Briggs, Gen. M. M ... Whistler, Ala.
J. T. Booth, M. C. B ... Whistler, Ala.
So'n Div., I. G. Motley, Supt ... Mobile, Ala.
John Fitzgerald, M. M ... Macon, Miss.
No'n Div.: E. S. Horsford, Supt. Jackson, Tenn.
M. T. Carson, M. M ... Jackson, Tenn.
Mobile & Spring Hill R. R. 5 g. 8 m. 10 lo. 90 cars.
F. Ingate, Supt ... Mobile, Ala.
Mont Alto R. R. 4-9 g. 21 m. 2 lo. 3 cars.
G. B. Weistling, Supt. & P. A ... Mont Alto, Pa.
Montgomery & Eufaula Ry. (See Central of Ga.)
Montour R. R. 4-8½ g. 11 m.
C. R. Brown, Supt ... Imperial, Pa.
Montpelier & Wells Riv. R. R. 4-8½ g. 38 m. 3 lo. 76c.
W. A. Stowell, Supt ... Montpelier, Vt.
Montrose Ry. 3 g. 28 m. 2 lo. 3 cars.
J. I. Blakslee, Supt ... Mauch Chunk, Pa.
Morgan's Louisiana & Tex. (See Tex. & N. O.)
Mount Washington Ry. 3½ m. 6 lo. 6 pass. cars.
Walter Aiken, Supt ... Franklin Falls, N. H.
Muncy Creek Ry. 4-8½ g. 10 m.
Benj. G. Welch, Rec ... Hughesville, Pa.

N

Nantasket Beach R. R. 4-8½ g. 3 m. 2 lo. 6 cars.
Nantucket R. R. 3 g. 3½ miles.
P. H. Folger, Supt ... Nantucket, Mass.
Narragansett Pier R. R. 4-8½ g. 8 m. 2 lo. 10 cars.
G. D. Lanphear, Supt ... Place Dale, R. I.
Nashua & Rochester R. R. (See Wor. & Nash.)
Nashville, Chattanooga & St. Louis R'y.,
5 g. 508 miles 87 lo. 1,521 cars.
F. de Funiak, Gen. Man ... Louisville, Ky.
J. W. Thomas, Gen. Supt ... Nashville, Tenn.
M. J. C. Wrenne, Supt ... Nashville, Tenn.
James Cullen, M. M ... Nashville, Tenn.
J. G. Sawyer, M. C. B ... Nashville, Tenn.
Natchez, Jackson & Col. R. R. 3-6 g. 43 m. 3 lo. 11 c.
J. H. Fitzpatrick, Supt ... Natchez, Miss.
Naugatuck R. R., 4-8½ g. 61 miles, 12 lo. 334 cars.
Geo. W. Beach, Supt ... Waterbury, Ct.
Henry Hanford, M. M ... Bridgeport, Ct.
Geo. W. Gray, M. C. B ... Bridgeport, Ct.
Nevada Central R. R. (See Union Pac.)
Nevada County N. G. R. R. 3 g. 23 m. 3 lo. 46 cars.
John F. Kidder, Supt ... Grass Valley, Cal.
New Brunswick Ry. 4-8½ g. 194 m. 12 lo. 266 cars.
E. R. Burpee, Supt ... Gibson, N. B.
Alfred Seely, Pur. Agt ... Gibson, N. B.
Jesse Mathews, M. M ... Gibson, N. B.
T. N. Burpee, M. C. B ... Gibson, N. B.
New Brunswick & Can. Ry. 4-8½ g. 127 m. 12 lo. 184c.
Henry Osborn, G. M. & P. A. St. Andrew's, N. B.
John Stewart, Supt ... St. Stephen, N. B.
Thos. Armstrong, M. M ... St. Andrew's, N. B.
G. Houlton, M. C. B ... St. Andrew's, N. B.
New Canaan R. R. 4-8½ g. 8 m. 2 lo. 4 cars.
Wm. St. John, Supt ... New Canaan, Conn.
New Castle & Oil City R. R. 4-9 g. 38 m. 4 lo. 30 cars.
A. Vandiwort, Supt ... New Castle, Pa.
New Haven & Derby R. R. 4-8½ g. 13 m. 3 lo. 58 c.
E. S. Quintard, Supt ... New Haven, Conn.
New Haven & No'mpton. 4-8½ g. 141 m. 21 lo. 510 c.
C. A. Goodnow, Supt ... New Haven, Ct.
C. N. Yeamans, Pur. Agt ... New Haven, Ct.
Henry Fox, M. M ... New Haven, Ct.
John Sweeny, M. C. B ... New Haven, Ct.
New Jersey & New York Ry. 6 g. 43 m. 6 lo. 40 c.
J. D. Hasbrouck, Gen. Man. Jersey City, N. J.
J. S. Drake, M. M ... Jersey City, N. J.
New Jersey Southern Ry. (See Central, N. J.)
New London Northern R. R. (See Central Ver.)
New Orleans Pacific Ry. 5 g. 85 m. 10 lo. 206 cars.
H. S. Morse, Supt ... New Orleans, La.
New Orleans & Selma R. R. 5 g. 21 m. 1 lo. 9 cars.
L. B. Scofield, Supt ... Selma, Ala.
N. Y. Central & Hudson River R.R.
4-8½ g. 962 m. 676 lo. 22,539 cars.
J. M. Toucey, Gen. Supt ... New York, N. Y.
R. C. Moore, Pur. Agt ... New York, N. Y.
Wm. Buchanan, Supt. M. P ... New York, N. Y.
L. Garey, Supt. Car Dept ... New York, N. Y.
N. Y. & Har. Div.: C. M. Bissell, Supt. do.
P. McQ. Gibson, M. M ... New York, N. Y.
C. E. Garey, M. C. B ... Morrisania, N. Y.
Hud. Riv. Div.: C. M. Bissell, Supt. N. York, N. Y.
Peter Smith, M. C. B ... New York, N. Y.
E'n Div.: Zenas C. Priest, Supt ... Utica, N. Y.
G. B. Van Vorst, M. M ... West Albany, N. Y.
D. Holt, M. C. B ... West Albany, N. Y.
W'n Div.: Geo. H. Burrows, Supt. Rochester, N. Y.
Amos Gould, M. M ... E. Buffalo, N. Y.
S. L. White, M. M ... Syracuse, N. Y.
E. A. Olmstead, M. C. B ... E. Buffalo, N. Y.
C. H. Burchard, M. C. B .. E. Rochester, N. Y.
Rd. Donaby, M. C. B ... Niagara Falls, N. Y.
N. Y. Chic. & St. L. Ry. 4-8½ g. 269 m. 36 lo. 1,063c.
L. Williams, Gen. Man ... Cleveland, O.
H. L. Morrill, Gen. Supt ... Cleveland, O.
Eas'tn Div.: Wallace McGrath, Supt ... Erie, Pa.
Mid. Div.: C. H. Cory, Supt ... Fostoria, O.
West'n Div.: M. E. Wattles, Supt ... Chicago, Ill.
New York City & Northern. 4-8½ g. 52 m. 7 lo. 91 c.
F. S. Gannon, Gen. Supt ... High Bridge, N. Y.
M. McNally, M. of M ... High Bridge, N. Y.
New York, Lake Erie & Western R. R.
4-8½ g. 1,020 m. 544 loco. 24,400 cars.
Robt. Harris, V. Pr. & G. Man. New York, N. Y.
E. S. Bowen, Gen. Supt ... New York, N. Y.
J. A. Hardenburg, Pur. Agt .. New York, N. Y.
F. M. Wilder, Supt. M. P. & M ... Susqueh'a, Pa.
E'n Div.: E. O. Hill, Supt ... Jersey City, N. J.
J. H. Vreeland, M. M ... Jersey City, N. J.
J. N. Mileham, M. C. B ... Jersey City, N. J.
Del. Div.: Chas. Neilson, Supt. Port Jervis, N. Y.
J. Van Vechten, M. M. & C. B. Pt. Jervis, N. Y.
Susq. Div.: R. B. Cable, Supt ... Elmira, N. Y.
V. Blackburn, M. M ... Susquehanna, Pa.
D. B. Goodell, M. C. B ... Elmira, N. Y.
Buf. & R. Divs.: C. W. Gardner, Supt.; and
G. B. Ross, M. M ... Buffalo, N. Y.
M. Wilder, M. C. B ... Buffalo, N. Y.
B. & S.-W. Div.: C. A. Brunn, Supt. do.
W'n Div.: W. B. Coffin, Supt. Hornellsville, N. Y.
E. H. Griggs, M. M ... Hornellsville, N. Y.
New York, New Haven & Hartford R. R.
4-8½ g. 203 m. 102 lo. 2,416 cars.
E. M. Reed, V. P. & Gen. Supt. New Haven, Ct.
R. N. Dowd, Pur. Agt ... New Haven, Ct.
N. Y. & N. H. Div.; J. M. Moody, Supt. New York.
Shore Div.: W. H. Stevenson, Supt. N. Haven, Ct.
H. Kettendorf, Supt. M. P ... New Haven, Ct.
Jas. Denver, M. C. B ... New Haven, Ct.
Hart. Div.: C. S. Davidson, Supt ... Hartford, Ct.
John Henny, Jr., Supt. M.P. & M. C. P ... do.
New York, Ontario & Western Ry.
4-8½ g. 345 m. 79 lo. 1,539 cars.
Jas. E. Childs, Gen. Supt ... Middletown, N. Y.
Chas. Clark, Pur. Agt ... Middletown, N. Y.
Edw. Minshull, M. M. & C. B. Middletown, N. Y.
Mid. Div.: N. R. Hankins, Supt. Middletown, N. Y.
No'n Div.: C. W. Lanpher, Supt ... Norwich, N. Y.
New York, Pennsylvania & Ohio R. R.
4-8½ g. 558 m. 215 lo. 7,387 cars.
P. D. Cooper, Gen. Man ... Cleveland, Ohio.
J. M. Ferris, Supt. Trans ... Cleveland, Ohio.
J. H. Holway, Pur. Agt ... Cleveland, Ohio.
Wm. Fuller, Gen. M. M. & C. B ... Cleveland, O.
S. V. Smith, Asst. Gen. M. C. B ... Kent, Ohio.
E'n Div.: A. L. Dunbar, Supt ... Meadville, Pa.
J. A. Cooper, M. M ... Meadville, Pa.
D. S. Dockstader, M. C. B ... Meadville, Pa.
J. F. Fosdick, For. Car Rep. Salamanca, N. Y.
W'n Div.: J. W. Alsop, Supt ... Galion, O.
Wm Hill, M. M ... Galion, O.
J. W. Holmes, For. Car Rep ... Galion, O.
Geo. Wilson, For. Car Rep ... Dayton, Ohio.
Maho'g Div.: N. F. Wood, Asst. Supt. Cleveland, O.
N. Wright, M. M ... Cleveland, O.
C. N. Thorp, Act. M. C. B ... Cleveland, O.
New York, Providence & Boston R. R.
4-8½ g. 72 m. 29 lo. 430 cars.
J. B. Gardner, Supt ... Providence, R. I.
Giles F. Ward, Pur. Agt ... Stonington, Conn.
J. H. Anderson, M. M. & C. B. Providence, R. I.
N. Y., Susquehanna & W'n. 4-9 g. 86 m. 20 lo. 350 c.
H. M. Britton, Gen. M. & P. A. New York, N. Y.
W. C. Ennis, M. M. & C. B ... Wortendyke, N. J.
N. Y. & Brighton Beach Ry. 3 g. 3 miles.
Geo. Edw. Harding, Gen. Supt. New York, N. Y.
New York & Norfolk R. R.
U. H. Painter, Supt ... Pocomoke City, Md.
N. Y. & Greenwood Lake Ry. 4-8½ g. 42 m. 8 lo. 53 c.
J. H. Tinney, Acting Supt ... Jersey City, N. J.
J. A. Hardenburg, Pur. Agt .. Jersey City, N. J.
N. Y. & Manhattan Beach Ry. 3 g. 23 m. 12 lo. 128 c.
D. C. Corbin, Man. Dir ... New York, N. Y.
New York & New England R. R.
4-8½ g. 463 m. 127 lo. 3,326 cars.
S. M. Felton, Jr., Gen. Man ... Boston, Mass.
W. W. McKim, Pur. Agt ... Boston, Mass.
O. M. Shepard, Supt. of Trans ... Boston, Mass.
Geo. E. Boyden, Supt. M. P. & M. Boston, Mass.
Elias E. Pratt, M. C. B ... Norwood, Mass.
Nor. Div.: P. St. M. Andrews, Supt ... Norwich, Ct.
Richard Colburn, M. M ... Norwich, Ct.
Prov. Div.: L. W. Palmer, Supt .. Providence, R. I.
W'n Div.: J. C. Rawn, Supt ... Hartford, Ct.
E. M. Humstone, M. M ... Hartford, Ct.
New York, Texas & Mexican Ry.
C. L. Leslie, Gen. Supt ... Rosenberg, Tex.
Newburg, Duchess & Conn. R. R. 4-8½ g. 58 miles.
C. S. Kimball, Gen. Supt. Dutchess Junc., N. Y.
W. G. Van Buskirk, M. M. & C. B. do
Newport & Wickford R. R. 4-8½ g. 3 m. 1 lo. 4 cars.
Theo. Warren, Supt ... Newport, R. I.
Norfolk & Western R. R. 5 g. 428 m. 82 lo. 1,044 c.
Frank Huger, Supt. Trans ... Lynchburg, Va.
Henry Fink, 2d V. Pr. & Gen. Man. Lynchb'g, Va.
J. P. Minetree, Storekeeper ... Petersburg, Va.
C. Blackwell, Supt. M. P ... Roanoke, Va.
Va. & Tenn. Div.: F. Sterk, M. M. Lynchburg, Va.
W. A. Morgan, M. C. B ... Lynchburg, Va.
Nor. & Pt. Div.: N. M. Osborne, Mast. Trans.,
J. T. Robinett, M. M. & C. B. Petersburg, Va.
North-Eastern R. R. of Ga. 5 g. 40 m. 2 lo. 18 cars.
H. R. Bernard, Supt ... Athens, Ga.
Jno. J. Longest, M. C. B ... Athens, Ga.
North-Eastern R. R. (S. C.) (See Wil. & Wel.)
North Pacific Coast R. R. 3 g. 80 m. 12 lo. 316 cars.
David Nye, Gen. Supt ... San Rafael, Cal.
W. F. Russell, Pur. Agt ... San Francisco, Cal.
Jas. Walch, M. M ... Sancelito, Cal.
North-Western Ohio Ry. (See Penna. Co.)
Northern (N. H.), and Concord & Claremont Rys.
4-8½ g. 173 m. 25 lo. 569 cars.
Geo. E. Todd, Supt ... Concord, N. H.
Ed. Studley, M. M. & C. B. & Pur. Agt. do.
Northern (N. J.) R. R. (See N. Y., L. E. & W'n.)
Northern Central Ry. (See Penna. (R. R.)
North'n Pacific R. R. 4-8½ g. 1,193 m. 104 lo. 3,089 c.
Herman Haupt, Gen. Man ... St. Paul, Minn.
John H. Ames, Pur. Agt ... St. Paul, Minn.
Geo. W. Cross, Supt. Trans ... St. Paul, Minn.
A. P. Farrar, Supt. Mach ... Brainerd, Minn.
St. P. & Minn. Divs.: B. McHugh, Supt., do.
Dakota Div.: C. T. Hobart, Supt ... Fargo, Dak.
A. Rupert, M. M ... Fargo, Dak.
Mo. Div.: D. R. Taylor, Supt ... Bismarck, Dak.
E. F. Doran, M. M ... Bismarck, Dak.
Pacific Div.: J. W. Sprague, Gen. Supt.; and
Otis Sprague, Supt ... New Tacoma, W. T.
F. C. Ford, M. M ... New Tacoma, W. T.
S. Wishart, M. C. B ... New Tacoma, W. T.
Pend d'Oreille Div.:
J. F. Curtis, M. M ... Ainsworth, W. T.
Northern & North-W'n Ry. 5-6 & 4-8½ g. 50 lo. 1,033 c.
James Webster, Supt ... Toronto, Can.
C. W. Postlethwaite, Pur. Agt ... Toronto, Can.
P. Clarke, M. M ... Toronto, Can.

O

Ogdensburg & Lake Champlain R. R.
4-8½ g. 122 m. 33 lo. 1,160 cars.
A. A. Gaddis, Gen. Man ... Malone, N. Y.
Abr. Klohs, Supt. & M. M ... Malone, N. Y.
Ohio Ry. 4-8½ g. 1,125 m. 305 lo. 9,313 cars.
J. H. Devereux, Pres ... Cleveland, O.
E. B. Thomas, Gen. Man ... Cleveland, O.
J. L. Yale, Pur. Agt ... Cleveland, O.
W. F. Turreff, Gen. M. M ... Cleveland, O.
(1) Cl., Col., Cin. & Ind. Divs. 471 m. 162 lo. 4,768 c.
Col. & Cin. Div.: Robt. Blee, Supt. Cleveland, O.
W. L. Gilmore, M. M ... Cleveland, O.
A. G. Steinbrenner, G. For. Car Dept. do.
Ind'p'lis Div.: C. C. Gale, Supt. Indianapolis, Ind.
Jas. Eckford, M. M ... Brightwood, Ind.
N. Mark, G. For. Car Dept. Brightwood, Ind.
(2) Ind'p'lis & St. Louis R. R. 266 m. 56 lo. 2,276 c.
C. C. Gale, Gen. Supt ... Indianapolis, Ind.
T. W. Ransom, M. M ... Mattoon, Ill.
Geo. H. Pratt, M. C. B ... Mattoon, Ill.
(3) Cin., Ham. & Day. Divs. 341 m. 84 lo. 2,314 c.
J. H. Barrett, Gen. Supt ... Cincinnati, O.
D. S. Cross, M. M ... Cincinnati, O.
W. H. H. Allison, G. For. Car Dept. do.
C. R. & C. Div.: W. S. Brewer, M. M. Richm'd, Ind.
Day. & Un. Div.: H. S. Gordon, M. M. Dayton, O.
D. & M. Rd.: E. E. Dwight, Supt ... Toledo, O.
Jno. Black, M. M ... Lima, Ohio.
Ohio Central R. R. 4-8½ g. 230 m. 30 lo. 3,201 cars.
G. G. Hadley, Gen. Man ... Toledo, O.
W. H. Vandegrift, Supt ... Toledo, O.
F. W. Stewart, Pur. Agt ... Toledo, O.
J. B. Morgan, M. M. & C. B ... Bucyrus, O.
Ohio Southern R. R. (See Ind., Bl. & W.)
Ohio & Mississippi Ry. 4-9 g. 615 m. 14 lo. 2,501 cars.
W. W. Peabody, Gen. Supt ... Cincinnati, O.
G. E. Atwood, Pur. Agt ... Cincinnati, O.
Cin. Div.: C. B. Cole, Supt ... Seymour, Ind.
John Thumser, M. M ... Seymour, Ind.
J. P. Coulter, M. C. B ... Aurora, Ind.
Arthur Donaldson, M. M ... Vincennes, Ind.
St. L. & Sp. Div.: C. M. Stanton, Supt. St. Louis, Mo.
J. W. Stokes, M. M. (Spring. Div.) .. Pana, Ill.
Louisv. Div.: C. B. Cole, Supt ... Louisville, Ky.
Oil City & Ridgway R. R. 4-8½ g. 6 m. 1 lo. 43 cars.
A. F. Kent, Gen. Man ... Oil City, Pa.
Old Colony R. R. 4-8½ g. 463 m. 110 lo. 2,862 cars.
J. R. Kendrick, Gen. Supt ... Boston, Mass.
R. W. Husted, Pur. Agt ... Boston, Mass.
J. K. Taylor, M. M ... Boston, Mass.
A. Gleason, M. C. B ... Boston, Mass.
Main Li. Div.: J. H. French, Supt ... Boston, Mass.
Cape Cod Div.: C. H. Nye, Supt .. Hyannis, Mass.
No. Div.: S. A. Webber, Supt ... Fitchburg, Mass.
George W. Reynolds, M. M ... Taunton, Mass.
Sam. Stevens, M. C. B ... Taunton, Mass.
Olean, Bradford & Warren; Bradford; Kinzua; and
Kendall & Eldred R. Rs. 3 g. 38 m. 9 lo. 222 cars.
J. W. Watson, Gen. Supt ... Olean, N. Y.
J. H. Poole, Pur. Agt ... Buffalo, N. Y.
Charles Turner, M. M. & C. B ... Olean, N. Y.
Olympia & Tenino R. R. 3 g. 15 miles.
William Mitchell, Supt ... Olympia, W. T.
Oregon Ry. & Nav. Co. 4-8½ g. 225 m. 31 lo. 930 cars.
A. Brandt, M. M ... Portland, Ore.
C. H. Prescott, Manager ... Portland, Ore.
J. M. Buckley, Asst. Man. & Act. Supt. do.
Geo. J. Ainsworth, Supt. (R. Div.) Pt'land, Ore.
K. Von Oterendorf, Supt. (O. Div.) S. F'cisco, Cal.
J. M. Drake, Pur. Agt ... Portland, Ore.
C. C. Hobart, Gen. M. M ... The Dalles, Ore.
Chas. A. Phipps, M. C. B ... The Dalles, Ore.
N. G. Div.: Wm. Reed, Man ... Portland, Ore.
James Walch, M. M ... Portland, Ore.
Oregon & California R. R. 4-8½ g. 200 m. 14 lo. 286 c.
R. Hoehler, Act. Man ... Portland, Ore.
J. Brandt, Jr., Gen. Supt ... Portland, Ore.
Owensboro & Nashville R. R. 5 g. 35 m.
W. L. Gude, Gen. Supt ... Owensboro, Ky.
Oxford & Henderson R. R. 13 miles.
A. H. A. Williams, Pres ... Oxford, N. C.

P

Paducah & Elizabetht'n R.R. 5 g. 186 m. 19 lo. 536 c.
Robert Meek, Gen. Supt ... Elizabethtown, Ky.
W. D. Robb, M. M. & C. B. Elizabethtown, Ky.
Painesville & Youngstown R. R. 3 g. 65 m. 7 lo. 319 c.
E. K. Hyndman, Gen. Man ... Pittsburg, Pa.
J. A. Newcome, Supt ... Painesville, O.
J. H. Jones, M. M ... Painesville, O.
Panama R. R. 5 g. 58 m. 14 lo. 534 cars.
H. A. Woods, Supt ... Aspinwall, U. S. Col.
Thomas S. O'Brien, M. M. Aspinwall, U. S. Col.
Parker & Karns City; and
Karns City & Butler R. Rs. 3 g. 27 m. 5 lo. 84 cars.
W. C. Moberly, Gen. Supt ... Parker City, Pa.
Philip Davies, M. M ... Parker City, Pa.
Wm. Wolford, M. C. B ... Parker City, Pa.
Passumpsic R. R. 4-8½ g. 165 m. 28 lo. 105 cars.
E. Raymond, Pres. & Pur. Agt. Boston, Mass.
H. E. Folsom, Supt ... Lyndonville, Vt.
L. L. Brigham, M. M ... Lyndonville, Vt.
L. F. Woodard, M. C. B ... Lyndonville, Vt.
Paulding & Cecil Ry. 4-8½ g. 7 m. 2 lo. 24 cars.
S. Frank Eagle, Pres ... Cecil, O.
Paw Paw and Tol. & S. Haven Rds. 3 g. 13 m. 2 lo. 7 c.
J. Ihling, Supt ... Lawton, Mich.
Peach Bottom R. R. 3 g. 55 m. 6 lo. 52 cars.
S. M. Manifold, Supt. & Pur. Agt ... York, Pa.
E. H. Williams, M. C. B ... York, Pa.
Pennsylvania Co.'s (9) Roads.
4-9 g. 2,838 m. 817 lo. 29,432 cars.
D. W. Caldwell, Gen. Man ... Pittsburg, Pa.
W. A. Baldwin, Man ... Pittsburg, Pa.
Wm. Mullins, Gen. Pur. Agt ... Pittsburg, Pa.
Joseph Wood, Supt. M. P ... Fort Wayne, Ind.
(1) Clev. & Pittsb'g R. R. 4-9 g. 224 m. 97 lo. 3,336 c.
R. V. Smith, Asst. Gen. Man ... Cleveland, O.
Philip Bruner, Supt ... Wellsville, O.
Mast. of Mach. Cleveland, O.
(2 & 3) Erie & Ashtabula Rds. 178 m. 29 lo. 1,340 c.
John M. Kimball, Supt ... Youngstown, O.
J. A. Wood, For. Shops ... Erie, Pa.
(4) Indianap. & Vincennes Rd. 117 m. 11 lo. 303 cars.
Jas. J. Turner, Supt ... Indianapolis, Ind.
M. M.
(5) Jeffersonville, Madison & Indianapolis R. R.
4-9 g. 217 m. 47 lo. 784 cars.
E. W. McKenna, Supt ... Louisville, Ky.
Wm. Swanston, M. M ... Jeffersonville, Ind.
Edw. Austin, M. C. B ... Jeffersonville, Ind.
(6) Northwestern Ohio Ry. 4-9 g. 79 m.
J. S. Morris, Supt ... Toledo, O.
(7) Pittsburg, Ft. Wayne & Chicago Ry.
4-9 g. 468 m. 278 lo. 6,782 cars.
E'n Div.: A. B. Starr, Supt ... Allegheny, Pa.
Geo. J. Parkin, M. M ... Allegheny, Pa.
G. W. Lowe, For. Shops ... Crestline, O.
W'n Div.: C. D. Law, Supt ... Ft. Wayne, Ind.
F. D. Casanave, M. M ... Ft. Wayne, Ind.
(8) Pittsburg, Cincinnati & St. Louis Ry.
4-9 g. 1,172 m. 336 lo. 6,482 cars.
Gen. Supt ... Columbus, O.
G. W. Rhodes, Supt. M. P. & M ... Columbus, O.
P. & Col. Div.: E. B. Taylor, Supt. Dennison, O.
Ross Kells, M. M ... Dennison, O.
A. K. Mansfield, M. C. B ... Steubenville, O.
Robt. Curtis, M. M ... Columbus, O.
Thos. Chamberlain, M. C. B ... Columbus, O.
C. & M. V. Div.: W. F. Black, Supt. Zanesville, O.
Leroy Kells, M. M ... Lancaster, O.
Daniel Jewell, M. C. B ... Lancaster, O.
Li. Mi. Div.: Ralph Peters, Supt ... Cincinnati, O.
Leroy Kells, M. M ... Cincinnati, O.
M. P. Ford, M. C. B ... Columbus, O.
Ind. Divs.: J. F. Miller, Supt ... Richmond, Ind.
Geo. H. Prescott, M. M ... Logansport, Ind.
Chas. H. Starr, M. C. B ... Logansport, Ind.
M. J. Rogers, M. M ... Indianapolis, Ind.
Chi. Div.: C. C. F. Bent, Supt .. Logansport, Ind.
(9) Terre Haute & Indianapolis R. R.
4-9 g. 374 m. 83 lo. 2,868 cars.
Joseph Hill, Gen. Supt ... St. Louis, Mo.
C. R. Peddle, P. Agt. & Supt. M. P. & M.; and
E. D. Carter, M. C. B ... Terre Haute, Ind.
Clinton Idler, M. M ... Indianapolis, Ind.
Chas. Butler, M. M ... Effingham, Ill.
A. W. Quakenbush, M. M ... Logansport, Ind.
Pennsylvania R. R. Co.'s Roads. (7 Gen. Divs.)
4-9 g. 2,704 m. 1,271 loco. 51,894 cars.
Frank Thomson, Gen. Man ... Philadelphia, Pa.
Enoch Lewis, Pur. Agt ... Philadelphia, Pa.
John Reilly, Supt. Trans ... Philadelphia, Pa.
T. N. Ely, Supt. Mo. Po. (4 Gen. Divs.) Altoona, Pa.
(1) Pennsylvania R. R. Divs.
4-9 g. 1,105 m. 627 lo. 35,583 cars.
Charles E. Pugh, Gen Supt ... Altoona, Pa.
Phila. Div.: S. M. Prevost, Supt. Philadelphia, Pa.
H. D. Garrett, M. M ... W. Philadelphia, Pa.
I. W. Van Houten, M. C. B ... W. Phila., Pa.
Mid. Div.: H. H. Carter, Supt ... Harrisburg, Pa.
E. L. Caum, M. M ... Harrisburg, Pa.
Samuel W. Myers, M. C. B ... Harrisburg, Pa.
Alt'a Div.: Wm. J. Latta, Supt ... Altoona, Pa.
G. W. Strattan, M. M ... Altoona, Pa.
John P. Levan, M. C. B ... Altoona, Pa.
Pitts. Div.: Robert Pitcairn, Supt ... Pittsburg, Pa.
D. O. Shaver, M. M ... Pittsburg, Pa.
J. G. Stewart, M. C. B ... Pittsburg, Pa.
W. Pa. Div.: A. P. Kirtland, Supt. Blairsville, Pa.
C. B. Street, M. M ... Blairsville, Pa.
M. H. Fails, M. C. B ... Blairsville, Pa.
Fred. Div.: J. B. Hutchinson, Supt ... York, Pa.
Tyrone Div.: S. S. Blair, Supt ... Tyrone, Pa.
Lew. Div.: Wm. M. Phillips, Supt. Lewistown, Pa.
Bed. Div.: Thos. A. Roberts, Supt ... Bedford, Pa.
Monong. Div.: David M. Watt, Supt. Pittsburg, Pa.
Wm. Lininger, M. M ... Pittsburg, Pa.
(2) United R. Rs. of N. J. Divs. 414 m. 257 lo. 4,668 c.
F. Wolcott Jackson, Gen. St. Jersey City, N. J.
N. Y. Div.: Jas. McCrea, Supt. Jersey City, N. J.
H. S. Hayward, At. St. M. P. Jersey City, N. J.
David H. Baker, M. C. B ... Jersey City, N. J.
L. A. Bosdevex, M. M ... Jersey City, N. J.
E. F. Bosdevex, M. C. B ... Jersey City, N. J.
Belv. Div.: J. A. Anderson, Supt. Lambertv., N. J.
R. McDowell, M. M ... Lambertville, N. J.
Amboy Div.: J. S. Buckalew, Supt. Camden, N. J.
Thos. Kerr, M. M ... So. Amboy, N. J.
P. S. Bogart, M. C. B ... So. Amboy, N. J.
(3) West Jersey R. R. 4-9 g. 163 m. 22 lo. 342 cars.
Joseph Crawford, Supt ... Camden, N. J.
W. McAllister, M. M ... Camden, N. J.
C. C. Williams, M. C. B ... Camden, N. J.
(4) Phila., Wilm. & Balt. R.R. 212 m. 86 lo. 1,488 c.
H. F. Kenney, Gen. Supt ... Philadelphia, Pa.
S. A. Hodgman, M. M ... Wilmington, Del.
Wm. Lundgren, M. C. B ... Wilmington, Del.
Cen. Div.: L. K. Lodge, Supt .. Philadelphia, Pa.
S. D. Danfield, M. M. & C. B ... Chester, Pa.
Del. Div.: I. N. Mills, Supt ... Philadelphia, Pa.
(5) Phila. & Erie R. R. Divs.: 376 m. 117 lo. 3,481 c.
R. Neilson, Gen. Supt ... Williamsport, Pa.
R. H. Soule, Supt. Mo. Po ... Williamsport, Pa.
E'n. Div.: Thos. Gucker, Supt. Williamsport, Pa.
Sun. H. & W. Div: F. L. Sheppard, Supt. do.
W. F. Beardsley, M. M ... Sunbury, Pa.
Mid. Div.: E. B. Westfall, Supt ... Renova, Pa.
Wm. L. Holman, M. M ... Renova, Pa.
West'n Div.: J. W. Reynolds, Supt ... Erie, Pa.
W. T. Smith, M. M ... Erie, Pa.
(6) Northern Central Ry. 4-9 g. 323 m. 152 lo. 6,163 c.
A. W. Sumner, Pur. Agt ... Baltimore, Md.
Susq., Shamokin, Elmira & Canadaigua Divs.:
Robert Neilson, Gen. Supt ... Williamsport, Pa.
R. H. Soule, Supt. M. P ... Williamsport, Pa.
Susq. Div.: Thos. Gucker, Supt. Williamsport, Pa.
G. W. Demarest, M. C. B ... Williamsport, Pa.
Sham. Div.: Supt ... Sunbury, Pa.
Elm. & Can. Divs.: S. Meade, Supt .. Elmira, N.Y.
Jas. Strode, M. M ... Elmira, N. Y.
J. C. Dyott, M. C. B ... Elmira, N. Y.
Baltimore Divs. of Northern Central; and
(7) Baltimore & Potomac R. R. 128 m. 29 lo. 356 c.
G. C. Wilkins, Supt ... Baltimore, Md.
A. W. Sumner, Pur. Agt ... Baltimore, Md.
A. O. Dayton, Supt. Mo. Po ... Baltimore, Md.
J. M. Coale, M. M ... Baltimore, Md.
Penn. Coal Co.'s R. R. 4-3 g. 67 m. 23 eng. 2,871 c.
J. B. Smith, Gen. Supt ... Dunmore, Pa.
Pennsylvania & Erie R. R.—Early Branch.
C. R. Early, Gen. Supt ... Ridgeway, Pa.
Pennsylvania & New York R. R. (See Lehigh.)
Pensacola & Perdido R. R. 6 g. 8 m. 5 lo. 73 cars.
B. F. Simmons, Pr. & Supt ... Pensacola, Fla.
People's Ry. 4-8½ g. 6 m. 3 lo. 17 cars.
Chas. Baker, Pres ... Pottsville, Pa.
Peoria, Decatur & Evansville Ry.
4-8½ g. 215 m. 12 lo. 725 cars.
G. L. Bradbury, Gen. Man ... Peoria, Ill.
Supt. & Pur. Agt ... Peoria, Ill.
P. Reilly, M. M ... Mattoon, Ill.
Peoria & Farmington R. R. 4-8½ g. 25 m. 2 lo. 25 c.
D. P. Phelps, Gen. Man ... Monmouth, Ill.
John F. Wallace, Supt ... Farmington, Ill.
Peoria & Pekin Union Ry. 4-8½ g. 20 m. 12 lo. 100 c.
Thos. B. Burnett, Gen. Supt. & P. A. Peoria, Ill.
R. F. Hurd, M. M. & C. B ... Peoria, Ill.
Perkiomen R. R. 4-8½ gauge 39 miles.
D. B. Clack, Supt ... Norristown, Pa.
Petersburg R. R. 4-8½ g. 64 m. 10 lo. 89 cars.
R. M. Sully, Gen. Supt ... Petersburg, Va.
L. E. Clark, Pur. Agt ... Petersburg, Va.
R. B. Andrew, M. M ... Petersburg, Va.
J. W. Fleming, M. C. B ... Petersburg, Va.
Phila., Marlton & Medford R. R. (Op. by Cam. & At.)
Phila., Wilmington & Balt. R. R. (See Penna. R. R.)
Phila. & Atlantic City Ry. 3-6 g. 65 m. 11 lo. 134 cars.
Ellis Clark, Supt. & Pur. Agt. Philadelphia, Pa.
J. W. Wright, M. M ... Camden, N. J.
E. Lippincott, M. C. B ... Camden, N. J.
Phila. & Reading. 4-8½ g. 869 m. 516 lo. 21,960 cars.
John E. Wootten, Gen. Man .. Philadelphia, Pa.
W. S. Wilson, Pur. Agt ... Philadelphia, Pa.
Geo. Eltz, Supt. Trans ... Reading, Pa.
L. B. Paxon, Eng. of Mach ... Reading, Pa.
John H. Rankin, M. C. B ... Reading, Pa.
No. Pa. & B. Brk. Div.: E. A. Sweigard, Supt., and
Jackson Richards, M. M ... Philadelphia, Pa.
C. & W. Br.: D. C. Reinhart, Sup. Williamsport, Pa.
W. H. Ellis, M. M ... Catawissa, Pa.
C. D. Ellis, M. C. B ... Catawissa, Pa.
Leb. & Tr. Br.: H. W. Tracy, Supt. Pine Grove, Pa.
Coal Br.: J. H. Olhausen, Supt. Mahony Plane, Pa.
R. & C. Br.: A. M. Wilson, Supt ... Columbia, Pa.
P. N. & N. Y. Rd.: W. M. Geary, S. Morristown, Pa.
S. & Le. Rd.: E. Dale, Supt ... Reading, Pa.
Pittsburg, Bradford & Buffalo Ry. 3 g. 31 m. 4 lo. 79c.
J. M. Dickey, Gen. Man ... Foxburg, Pa.
M. Mandeville, Supt ... Foxburg, Pa.
Pittsburg, Cincinnati & St. Louis Ry. (See Penna. Co.)
Pittsburg, Ft. Wayne & Chicago Ry. (See Penna. Co.)
Pittsburg Southern Ry. 3 g. 38 m. 4 lo. 64 cars.
Jos. Ramsey, Jr., Supt. & P. A ... Pittsburg, Pa.
W. S. Marshall, M. M ... Pittsburg, Pa.
E. B. Gosline, M. C. B ... Pittsburg, Pa.
Pitts. & Castle Shannon R. R. 3-4 g. 9 m. 5 lo. 388 c.
James M. Bailey, Gen. Supt ... Pittsburg, Pa.
A. C. Hays, Supt ... Pittsburg, Pa.
Pitts. & Lake Erie R. R. 4-8½ g. 70 m. 30 lo. 1,688 c.
W. C. Quincy, Gen. Man ... Pittsburg, Pa.
R. W. Jones, Mast. Trans ... Pittsburg, Pa.
S. W. Haines, M. M ... Pittsburg, Pa.
Pittsburg & Western R. R. 3 g. 47 m. 2 lo. 76 cars.
E. K. Hyndman, Gen. Man ... Allegheny, Pa.
C. P. Ford, Pur. Agt ... Allegheny, Pa.
W. L. Hofecker, M. M ... Zelienople, Pa.
Port Huron & No.-Western Ry. 3 g. 105 m. 4 lo. 66 c.
H. McMorran, G. Man. & P. A. Port Huron, Mich.
I. R. Wadsworth, Supt ... Port Huron, Mich.
Chas. Deifenbaugh, M. M ... Port Huron, Mich.
Benj. Hillier, M. C. B ... Port Huron, Mich.
Port Jervis & Monticello R. R. 6 g. 24 m. 2 lo. 13 c.
M. V. Heller, Gen. Man ... Port Jervis, N. Y.
Port Royal & Augusta Ry. 5 g. 112 m. 11 lo. 235 c.
J. N. Bass, Gen. Supt ... Augusta, Ga.
Geo. Riley, M. M ... Port Royal, S. C.
J. H. Milton, M. C. B ... Port Royal, S. C.
Portland & Ogdensburg. 4-8½ g. 114 m. 9 lo. 289 c.
J. Hamilton, Gen. Supt. & P. A .. Portland, Me.
Geo. H. Poor, M. M ... Portland, Me.
W. G. Brewer, M. C. B ... Portland, Me.
Portland & Rochester R. R. 4-8½ g. 52 m. 7 lo. 175 c.
G. P. Wescott, Supt. & Pur. Agt. Portland, Me.
E. H. C. Tompson, F. of Mach ... Portland, Me.
David Dow, For. of Car Repairs. Portland, Me.
Potomac, Fred.'g & Pied. R. R. 3 g. 38 m. 2 lo. 32 c.
W. M. Crafton, Supt ... Fredericksburg, Va.
Pough., Hart. & Bos. R. R. 4-8½ g. 45 m. 4 lo. 64 c.
J. A. Perkins, Supt ... Poughkeepsie, N. Y.
John L. Driscoll, M. M ... Poughkeepsie, N. Y.
Prince Edward County Ry. 4-8½ g. 32 m. 2 lo. 15 c.
G. W. McMullen, Gen. Man ... Picton, Ont.
Prince Edward Island Ry. 3-6 g. 199 m. 17 lo. 280 c.
L. B. Archibald, Supt. & Pur. Agt.;
Jos. Unsworth, M. Supt. & Storekeeper; and
D. M. Fraser, M. C. B .. Charlottetown, P. E. I.
Profile & Franconia Notch R. R. 3 g. 13 m. 2 lo. 12 c.
C. H. Greenleaf, Supt ... Profile House, N. H.
Prospect Park & Coney I'd. 4-8½ g. 13 m. 8 lo. 144 c.
R. Schermerhorn, Supt ... Coney Island, N. Y.
Prov., Warren & Bristol R. R. 4-8½ g. 19 m. 5 lo. 38 c.
Waterman Stone, Supt ... Providence, R. I.
Rufus Smith, M. M. & C. B ... Bristol, R. I.
Prov. & Springfield R. R. 4-8½ g. 23 m. 3 lo. 83 c.
Wm. Tinkham, Gen. Man ... Providence, R. I.
G. T. Richardson, M. M ... Providence, R. I.
Prov. & Worcester. 4-8½ g. 66 m. 30 lo. 858 c.
W. E. Chamberlain, Supt ... Providence, R. I.
A. Griggs, M. M. & C. B ... Providence, R. I.
Pullman's Palace Car Co. 472 passenger cars.
A. B. Pullman, 2d V.-Pr. & G. M .. Chicago, Ill.
Geo. F. Brown, Gen. Supt ... Chicago, Ill.
Wm. A. Angell, Pur. Agt ... Chicago, Ill.
S. W. Bretzfield, Asst. Pur. Agt. New York, N.Y.
A. Rapp, Man. (Chicago Works) .. Chicago, Ill.
Fr. Bradley, Supt. (Det. Shops) .. Detroit, Mich.

Q

Quebec Central Ry. 4-8½ g. 47 m. 3 lo. 79 cars.
A. Steele, Supt ... Sherbrooke, Que.
Quebec, Montreal, Ottawa & Occidental Ry.
4-8½ g. 329 miles, 34 loco. 556 cars.
L. A. Senecal, Gen. Supt ... Montreal, Can.
W. E. Blumhart, Pur. Agt ... Montreal, Can.
A. Davis, Mech. Supt ... Montreal, Can.
Quebec & Lake St. John Ry. 4-8½ g. 24 m. 3 lo. 43 c.
J. G. Scott, Manager ... Quebec, Can.

R

Raleigh & Augusta Air-Line; Seaboard & Roanoke;
Raleigh & Gaston R. Rs. 4-8½ g. 275 m. 38 lo. 607 c.
J. M. Robinson, Pr. & G. Man ... Baltimore, Md.
Raleigh Rds: J. C. Winder, G. Supt. & Pur. Agt.
B. R. Harding, Supt. of Mach. Raleigh, N. C.
R. J. Bishop, M. C. B ... Raleigh, N. C.
S. & R. Rd.: E. G. Ghio, M. Trans. Portsmouth, Va.
J. A. Walton, Pur. Agt ... Portsmouth, Va.
M. M. Pendleton, Sup. M. P. & M. Portsmo'th, Va.
Rensselaer & Saratoga R.R. (See Del. & Hud. Can. Co.)
Rhinebeck & Connecticut. 4-8½ g. 42 m. 5 lo. 85 c.
J. H. Jones, Gen. Supt ... Rondout, N. Y.
John Dykeman, M. M ... Rondout, N. Y.
John H. Decker, M. C. B ... Rondout, N. Y.
Richmond, Fredericksburg & Potomac R. R.
4-8½ g. 83 m. 14 lo. 165 cars.
E. T. D. Myers, Gen. Supt ... Richmond, Va.
T. L. Courtney, Pur. Agt ... Richmond, Va.
H. Khun, M. M ... Richmond, Va.
W. H. Trainham, M. C. B ... Richmond, Va.
Richmond & Alleghany R.R. 4-9 g. 250 m. 18 lo. 771c.
Decatur Axtell, Gen. Man ... Richmond, Va.
Geo. W. Agee, Supt ... Richmond, Va.
J. P. Williams, Pur. Agt ... Richmond, Va.
Geo. D. Harris, M. M. & C.B ... Richmond, Va.

Richmond & Danville R. R. Co.'s Roads.
1,603 miles 214 loco. 3,590 cars.
T. M. R. Talcott, *Gen. Man*......Richmond, Va.
W. R. Riddick, *Act. Pur. Agt*...Richmond, Va.
R. D. Wade, *Supt. Mo. Po*......Richmond, Va.
T. W. Gentry, *M. M*..............Manchester, Va.
(1) Richmond & Danville R. R.
5 g. 764 m. 131 lo. 2,480 cars.
Peyton Randolph, *As. G. Man*..Richmond, Va.
Richmond & Danville Div.:
5 g. 255 m. 79 l. 1,797 cars.
Wm. H. Green, *Supt*.........Richmond, Va.
T. W. Gentry, *M. M*.........Richmond, Va.
J. B. Vaughan, *For. Car Sh*...Richmond, Va.
North Carolina Div. 5 g. 223 m. 22 lo. 268 cars.
A. B. Andrews, *Supt*.........Raleigh, N. C.
W. H. Turrentine, *M. M.* Company's Shops, N.C.
J. C. Holt, *For. Car Sh.* Company's Shops, N. C.
Atlanta & Char. Air Line. 5 g. 269m. 30 lo. 415 c.
I. Y. Sage, *Supt*.........Atlanta, Ga.
C. D. Wall, *M. M*.........Atlanta, Ga.
Z. T. Smith, *For. Car Sh*.......Atlanta, Ga.
(2) Charlotte, Col.& Aug. R. R. 5g. 191 m. 20 lo. 261 c.
G. R. Talcott, *Supt*.........Columbia, S. C.
J. H. Green, *M. M.* (2 roads)...Columbia, S. C.
J. H. Perkins, *For. Car Sh*....Columbia, S. C.
(3) Columbia & Greenville R. R. 5 g. 297 m. 22 l. 218 c.
J. W. Fry, *Supt*.........Columbia, S. C.
J. O. Meredith, *For. E.& C. Rep*..Helena, S.C.
(4) Virginia Midland Ry. 4-8½ g. 951 m. 41 lo. 631 c.
W. M. S. Dunn, *Eng. & Supt.* Alexandria, Va.
J. E. Waddey, *M. of M*......Alexandria, Va.
J. T. Nalls, *M. C. of B*......Alexandria, Va.
Richmond & Petersburg R. R. (*See Wil. & Weldon.*)
Rio Grande R. R. 3-6 g. 22 m. 3 lo. 39 cars.
M. J. Gomila, *Rec. & Gen. Man* Brownsville, Tex.
G. W. Rendall, *M. M*.........Brownsville, Tex.
M. Markwood, *M. C. B*.........Brownsville, Tex.
Rochester & Lake Ontario Ry. 4-8½ g. 6 m. 2 lo. 10 c.
Henry S. Hebard, *Pres*.........Rochester, N. Y.
Rochester & Pittsb'g. R.R. 4-8½ g. 108 m. 11 lo. 612 c.
Geo. E. Merchant, *Gen. Man*...Rochester, N.Y.
J. P. Hovey, *M. M*.........Rochester, N. Y.
Rock Island & Mercer County R. R., and
Rock I'd & Peoria Ry. 4-8½ g. 113 m. 12 lo. 357 c.
R. R. Cable, *V.-P. & Gen. Supt*..Rock Island, Ill.
R. I. & P. Ry.: H. B. Sudlow, *A. Supt. & P. A.* do
Joseph Elder, *M. M*.........Peoria, Ill.
R. I. & M. C. Rd.: B. T. Cable, *Supt.* R'k Island, Ill.
Rockwood & Tennessee Riv. Ry. 3 g. 6. m.
H. Clay Evans, *Supt*.........Rockwood, Tenn.
Rogersville & Jefferson R. R. 5 g. 16 m. 2 lo.
C. M. Lentz, *Supt*.........Rogersville, Tenn.
Rome (Ga.) R. R. 5 g. 20 m. 2 lo. 13 cars.
Eben Hillyer, *Supt*.........Rome, Ga.
O. W. Harbin, *M. M. & C. B*.........Rome, Ga.
Rome, Watertown & Ogdensburg R. R.
4-8½ g. 409 m. 51 lo. 1,248 cars.
E. A. Van Horne, *Gen. Supt*......Oswego, N. Y.
Geo. W. B. Cushing, *Pur. Agt.* New York, N. Y.
Geo. H. Haselton, *M. M. & C. B*..Oswego, N. Y.
Rumford Falls & Buckfield R.R. 4-8½ g. 29 m. 2 l. 42 c.
O. Hayford, *Supt*.........Canton, Me.

S

Sabine & East Texas Ry. 4-8½ g. 25 m. 5 lo. 306 c.
R. H. Cousins, *Supt*.........Beaumont, Tex.
Sacramento & Placerville R. R. 4-8½ g. 49 m. 3 lo. 68 c.
J. B. Wright, *Supt*.........Sacramento, Cal.
Jno. R. Watson, *Pur. Agt*.....Sacramento, Cal.
A. J. Stevens *M. M*.........Sacramento, Cal.
Benj. Welch, *M. C. B*.........Sacramento, Cal.
Saginaw Bay & Northw'n R. R. 4-8½ g. 20 miles.
E. W. Gerrish, *Supt*.........Pinconning, Mich.
Saginaw Valley & St. Louis R. R. 4-8½g. 35 m. 4 l. 64 c.
N. W. Merrill, *Supt*.........Saginaw, Mich.
Geo. C. Watrous, *M. M*.........Iona, Mich.
Salem & Eastern R. R. 4-8½ g. 9 miles.
R. T. Parker, *Supt*.........Salem, Mo.
Salisbury R. R. 4-8½ g. 9 m. 1 lo. 2 cars.
R. J. Batzer, *Supt*.........Meyersdale, Pa.
Sandy River R. R. 2 g. 18 m. 2 lo. 10 cars.
Joel Wilbur, *Supt*.........Phillips, Me.
San Francisco & No. Pac. 4-8½ g. 112 m. 11 lo. 244 c.
Arthur Hughes, *Gen. Man*..San Francisco, Cal.
H. C. Whiting, *Supt*.........Petaluma, Cal.
P. E. Dougherty, *Pur. Agt* San Francisco, Cal.
Ed Reynolds, *M. M*.........Donahue, Cal.
John Martin, *M. C. B*.........Donahue, Cal.
San Luis Obispo & Santa Maria Val. R. R. 3 g. 11 m.
C.A. Haskin, *Supt. & P. Agt.* San Luis Obispo, Cal.
W. H. Masterman, *M. M* San Luis Obispo, Cal.
J. M. Vincent, *M. C. B*....San Luis Obispo, Cal.
Santa Cruz R. R. 3 g. 21 m. (*See So'n Pac.; Co'n Div.*)
Savannah, Florida & W'n Ry. 5 g. 422 m. 26 lo. 396 c.
H. S. Haines, *Gen. Man*.........Savannah, Ga.
R. G. Fleming, *Supt*.........Savannah, Ga.
W. B. McKee, *Pur. Agt*.........Savannah, Ga.
James D. Hollister, *M. of Mach*..Savannah, Ga.
P. N. Raynal, *For. Car Dept*....Savannah, Ga.
Sav., Griffin & No. Ala. R. R. Op. by Central (Ga.).
Schuylkill & Lehigh R. R. 4-8½ g. 43 miles.
Elbridge Dale, *Supt*.........Reading, Pa.
Schoharie Valley R. R. (*See Middleburg & Sch.*)
Scioto Valley R. R. 4-8½ g. 131 m. 15 lo. 460 cars.
Geo Skinner, *Supt*.........Columbus, O.
C. G. Browning, *M. M. & P. A*..Portsmouth, O.
Seaboard & Roanoke R. R. (*See Ral. & Aug. A. L.*)
Selma & Greensboro R. R. 5 g. 45 m. 2 lo. 39 cars.
A. M. Fowlkes, *Supt*.........Selma, Ala.
J. M. Levis, *M. M*.........Marion, Ga.
Shenandoah Valley R. R. 4-8½ g. 143 m. 15 lo. 104 c.
J. H. Sands, *Supt*.........Hagerstown, Md.
W. C. De Armond, *Pur. Agt.* Philadelphia, Pa.
Chas. Blackwell, *Supt. of M. P*..Roanoke, Va.
Shenango & Allegheny R R 4-9½ g. 47 m. 6 lo. 156 c.
J. T. Blair, *G. Supt. & Pur. Agt.* Greenville, Pa.
Edw Richardson, *M. M. & C. B.* Greenville, Pa.
Shepaug R. R. 4-8½ g. 38 m. 3 lo. 27 cars.
Edwin McNeill, *Supt*.........Litchfield, Ct.
C. M. Allen, *M. M*.........Litchfield, Ct.
Ship Is., Ripley & Ky. R. R. 3 g. 25 m. 2 lo. 23 cars.
C. L. Harris, *Supt*.........Ripley, Miss.
Silver Lake Ry. 6 g. 6 m. 2 lo. 3 cars.
E. G. Matthews, *Supt*.........Perry, N. Y.
Sioux City & Pacific R. R. 4-8½ g. 427 m. 21 lo. 594 c.
P. E. Hall, *Gen. Man. & P. A.* Cedar Rapids, Ia.
J. S. Wattles, *Supt*.........Missouri Valley, Ia.
C. F. McCoy, *Asst. Supt*.........Blair, Neb.
C. H. Foster, *M. M. & C. B.* Missouri Valley, Ia.
Skaneateles R. R. 4-8½ g. 5 m. 2 lo. 4 cars.
J. McNamara, *Supt*.........Skaneateles, N. Y.
Somerset R. R. 4-8½ g. 25 m. 2 lo. 11 cars.
W. M. Ayer, *Act. Supt*......W. Waterville, Me.
Sonoma Valley (3 g). *See San Fran. & No. Pacific.*
South Carolina Ry. 5 g. 243 m. 42 lo. 685 cars.
John B. Peck, *Gen. Man*.........Charleston, S. C.
S. B. Pickens, *Pur. Agt*.........Charleston, S. C.
P. J. Cochrane, *Mast. of Mach.* Charleston, S. C.
Geo. H. Gramling, *M. C. B*....Charleston, S. C.
South-Eastern Ry. 4-8½ g. 161 m. 14 lo. 446 cars.
Bradley Barlow, *Gen. Man*.....St. Albans, Vt.
H. A. Alden, *Supt*.........Richford, Vt.
A. G. Eastman, *M. M*.........Richford, Vt.
South Florida R. R. 3 gauge 40 m. 4 lo. 20 cars.
B. R. Swoope, *Supt. & P. A*.........Sanford, Fla.
J. A. Campbell, *M. M*.........Sanford, Fla.
A. D. Stentiford, *M. C. B*.........Sanford, Fla.
South Mountain R. R. 4-8½ g. 18 m. 4 lo. 22 c.
W. H. Woodward, *Supt.* Pine G've Furnace, Pa.
South Pacific Coast R. R. 3 g. 81 m. 10 lo. 260 cars.
A. H. Fracker, *Gen. Supt*..San Francisco, Cal.
E. L. Reese, *M. M. & C. B*.........Newark, Cal.
South-Western R. R. (Ga.) (*See Central of Ga.*)

South-Western Ry. (Ky.) 4-8½ g. 4 m. 1 lo. 38 cars.
M. Tabler, *Supt*.........Harrodsburg, Ky.
Southern Central R. R. 4-8½ g. 114 m. 16 lo. 447 c.
James G. Knapp, *Supt*.........Auburn, N. Y.
Chas. G. Brown, *M. M*.........Auburn, N. Y.
H. Mooney, *M. C. B*.........Auburn, N. Y.
Southern Maryland R. R. 4-9 g. 47 m.
Shields Burr, *Supt*.........Brandywine, Md.
Southern Pacific R. R. 4-8½ g. 161 m. 29 lo. 728 c.
Northern Div. (*For other Divs. see Cen. Pac.*)
A. C. Bassett, *Supt*.........San Francisco, Cal.
J. R. Watson, *Pur. Agt*...San Francisco, Cal.
J. T. Wilson, *M. M*.........San Francisco, Cal.
F. N. Bellisle, *M. C. B*.....San Francisco, Cal.
Springfield, Effingham & So.-Eastern and
Bloomfield Rys. 3 g. 89 m.
W. C. Lyon, *Gen. Man*.........Robinson, Ill.
Spring Hill & Parrsboro Ry. 4-8½ g. 32 m. 1 lo. 64 c.
J. Skillan, *Supt*.........Parrsboro, N. S.
Springville & Sardinia Ry. 3 g. 12 m. 2 lo. 9 c.
B. Chafee, *Pres*.........Springville, N. Y.
St. Clairsville Ry. 3 ft. gauge 7 miles 1 lo. 3 cars.
J. H. Patterson, *Pres*.........St. Clairville, O.
St. Croix & Penobscot R. R. 4-8½ g. 22 m. 4 lo. 195 c.
S. W. Haycock, *Supt*.........Calais, Me.
G. H. Corsen, *M. M*.........Milltown, Me.
H. C. Tincker, *M. C. B*.........Milltown, Me.
St. Joe & Desloge Ry. 3 ft. gauge.
J. Naramore, *Supt*.........Bonne Terre, Mo.
St. John & Maine Ry. 4-8½ g. 92 m. 6 lo. 110 cars.
H. D. McLeod, *Supt.*
St. John's Ry. 4-8½ g. 14½ m. 2 lo. 24 cars.
R. McLaughlin, *Pr. & Supt*. Jacksonville, Fla.
Geo. Ferrow, *M. of Mach*...St. Augustine, Fla.
St. Johns & Lake Eustis Ry. 3 g. 26 m.
T. S. Davies, *Supt*.........Volusia, Fla.
St. Johnsb'ry & Lake Champ 4-8½ g. 120 m 10 lo. 197 c.
A. B. Jewett, *Supt. & P. A.* St. Johnsbury, Vt.
Geo. E. Howe, *M. M. & C. B.* St. Johnsbury, Vt.
St. Joseph & Des Moines R. R. (*See K. C., St. J. & C. B.*)
St. Lawrence & Ottawa Ry. 4-8½ g. 59 m. 10 l. 146 c.
Walter Shanley, *Gen. Man*.........Ottawa, Ont.
Archer Baker, *Gen. Supt*.........Ottawa, Can.
Calvin Dame, *M. M. & C. B*.....Prescott, Can.
St. Louis, Alton & Terre Haute R. R.
Main Line. (*See Ind. & St. L. Div.; Ohio Ry.*)
St. Louis & Cairo Div.: 4-8½ g 123 m. 16 lo. 778 c.
G. W. Parker, *Gen. Man*.........St. Louis, Mo.
A. M. De Clerq, *M. M*.........St. Louis, Mo.
St. Louis Bridge Co. and Tunnel R. R.
4-8½ g. 17 m. 15 lo. 11 cars.
Wm. Taussig, *Gen. Man*.........St. Louis, Mo.
G. O. Clinton, *Supt*.........St. Louis, Mo.
E. J. Brandley, *Pur. Agt*.........St. Louis, Mo.
H. M. Smith, *M. M*.........St. Louis, Mo.
St. Louis Coal R. R. 4-8½ g. 28 m. 1 lo. 78 cars.
R. J. Cavett, *Supt*.........Carbondale, Ill.
St. Louis, Ft. Scott & Wichita R. R. 4-8½ g. 20 miles.
F. Tiernan, *V. P. & Gen. Man*..Fort Scott, Kan.
J. D. Hill, *Gen. Supt*.........Fort Scott, Kan.
St. L., Hannibal & Keokuk. 4-8½ g. 59 m. 1 lo. 23 c.
W. W. Walker, *Supt*.........Hannibal, Mo.
Geo. Douglass, *Pur. Agt*.........Hannibal, Mo.
St. Louis, Iron Mountain & Southern Ry. (1);
International & Great Northern R. R. (2); and
Texas & Pacific Ry. (3).
4-8½ g. 2,678 m. 302 lo. 6,119 cars.
H. M. Hoxie, *Gen. Man*.........St. Louis, Mo.
R. B. Lyle, *Gen. Pur. Agt*.........St. Louis, Mo.
(1) St. L., I. Mt. & So. 4-8½ g. 710 m. 37 lo. 4,081 c.
E. L. Dudley, *Supt*.........St. Louis, Mo.
O. A. Haynes, *Supt. Mach*.........De Soto, Mo.
Oscar Doolittle, *M. C. B*.........St. Louis, Mo.
St. Louis Div.: J. J. Frey, *Supt*....St. Louis, Mo.
W. H. Harris, *M. M*.........De Soto, Mo.
Ark. Div.: Wm. Kerrigan, *Supt.* Little Rock, Ark.
L. Finlay, *M. M. & C. B*....Little Rock, Ark.
(2) Inter. & Gr't No'n R. R. 4-8½ g. 776 m. 45 lo 932 c.
Jos. Herrin, *Supt*.........Palestine, Tex.
R. H. Johnson, *M. M*.........Palestine, Tex.
H. H. Sessions, *M. C. B*.........Palestine, Tex.
(3) Texas & Pac. Ry. 4-8½ g. 1,030 m. 120 lo. 1,106 c.
Geo. L. Sand, *Supt*.........Marshall, Tex.
J. F. Sechler, *Gen. M. M*.........Marshall, Tex.
H. H. Sessions, *M. C. B*.........Marshall, Tex.
So'n Div.: Hugh Irvine, *Supt*.....Longview, Tex.
W. Garrison, *M. M*.........Marshall, Tex.
Tr. Con. Div.: J. S. Noble, *Supt* Texarkana, Ark.
Thos. Ormerod, *M. M*.........Texarkana, Ark.
W'n Div.: Wm. Davis, *Supt*.....Ft. Worth, Tex.
W. H. Reilly, *Asst. G. M. M* Fort Worth, Tex.
St. L. Keokuk & No.-W'n. 4-8½ g. 187 m. 14 lo. 312 c.
A. L. Griffin, *V. Pr. & Gen. Supt*..Keokuk, Ia.
J. W. Smith, *Gen. Supt*.........Keokuk, Ia.
John A. Blood, *Pur. Agt*.........Keokuk, Ia.
Wm. Foley, *M. M*.........Keokuk, Ia.
St. L., Salem & Little Rock. 4-9 g. 69 m. 5 lo. 103 c.
H. A. Crawford, *V. Pr. & P. A*...St. Louis, Mo.
E. B. Sankey, *Supt*.........Salem, Mo.
Thomas Everson, *M. M*.........Steelville, Mo.
J. W. Houston, *M. C. B*.........Steelville, Mo.
St. L., Van. & T. H. (*See T. H. & I. Div. of Penna. Co.*)
St. L. & San Fran. Ry. 4-8½ g. 758 m. 71 lo. 2,490 c.
C. W. Rogers, *2d V. Pr & G. Man*..St. Louis, Mo.
D. H. Nichols, *Mast. Tran*..No. Springfield, Mo.
A. G. Thompson, *Pur. Agt*.........St. Louis, Mo.
M. Kearney, *M. M. & C. B*. No. Springfield, Mo.
Mo. & Ark. Div.: W. A. Thoms, *Supt.* do.
Kan. Div.: J. R. Wentworth, *Supt.* Neodesha, Kan.
St. Martin's & Upham Ry. 4-8½ g. 30 m. 1 lo.
A. E. Killam, *Manager*.........St. Martin's, N. B.
St. Paul, Minneapolis & Manitoba Ry.
4-8½ g. 1,050 m. 116 lo. 3,116 cars.
A. Manvel, *Gen. Man*.........St. Paul, Minn.
H. C. Ives, *Asst. Gen. Man*......St. Paul, Minn.
E. B. Wakeman, *Supt. Trans*...St. Paul, Minn.
J. C. Morrison, *Pur. Agt*.........St. Paul, Minn.
H. Middleton, *M. M. & C. B*....St. Paul, Minn.
Breck. Div.: A. Guthrie, *Supt*.....St. Paul, Minn.
F. F. Div.: J. B. Rice, *Supt*.........St. Paul, Minn.
No'n Div.: C. O Wheeler, *Supt.* Fergus Falls, Minn.
St. Paul & Duluth R.R. 4-8½ g. 195 m 24 lo. 580 c.
S. R. Stimson, *Gen. Supt*.........St. Paul, Minn.
J. G. Callahan, *Pur. Agt*.........St. Paul, Minn.
W. McFarland, *M. M*.........St. Paul, Minn.
John Hill, *M. C. B*.........St. Paul, Minn.
State Line & Sullivan R. R. 4-8½ g. 29 m. 2 lo. 3 c.
J. O. Blight, *Supt*.........Towanda, Pa.
Staten Island R. R. 4-8½ g. 13 m. 4 lo. 17 c.
John W. Wilber, *Supt*.........Tottenville, N. Y.
Sterling Mountain Ry. 6 g. 8 m. 2 lo. 145 cars.
J. C. Missimer, *Supt*.........Sloatsburg, N. Y.
Stony Creek R. R. 4-8½ g. 10 miles.
Geo. B. Boggs, *Supt*.........Norristown, Pa.
Howard Boyd, *Pur. Agt*.........Norristown, Pa.
Strasburg R. R. 4-8½ g. 5 miles.
Isaac Phenegar, *Lessee*.........Leman Place, Pa.
Sussex R. R. (*See Del., L. & W.*)
Syracuse, Binghamton & N. Y. R. R. (*See D. L. & W.*)
Syracuse, Chenago & N. Y. 4-8½ g. 44 m. 4 lo. 60 c.
Albert Allen, *Supt*.........Syracuse, N. Y.
George W. West, *M. M*.........Syracuse, N. Y.
Wm. J. McMichael, *M. C. B*... Syracuse, N. Y.
Syracuse, Geneva & Corning; Corning, Cowanasque
& Antrim R. Rs. 4-8½ g. 121 m. 23 lo. 1,044 c.
A. H. Gorton, *Supt*.........Corning, N. Y.
Andrew Beers, *Pur. Agt*.........Corning, N. Y.
O. C. Patchell, *M. M. & C. B*....Corning, N. Y.

T

Talbotton R. R. 7 miles.
W. H. Martin, *Supt*.........Talbotton, Ga.
Terre Haute & Indianapolis R. R. (*See Penna. Co.*)
Terre Haute & Logansport R. R. (*Op. by T. H. & Ind.*)
Terre Haute & So.-Eastern Ry. 4-9 g. 40 miles.
Geo. Atherton, *Supt*.........Terre Haute, Ind.

Texas-Mexican; and Mexican National Rys.
3 g. 217 m. 4 lo. 54 cars.
G. C. Gardner, *Gen. Man*.....New York, N. Y.
A. R. Roberts, *Pur. Agt*.....New York, N. Y.
S. T. Fuller, *Gen. Supt*.....Corpus Christi, Tex.
Tex. Mex. Ry.: Wm. Sutcliffe, *M. M. & C. B.* do.
Mex. Nat. Ry.: J. C. Monroe, *M. M.* Mexico, Mex.
Maj. W. J. Brokaw, *M. M*.....Manzanillo, Mex.
Texas Western Ry. 3 g. 42 m. 2 lo. 34 cars.
J. W. Goodwin, *Supt*.........Houston, Tex.
Texas & New Orleans; Louisiana W'n; and Morgan's
Louisiana & Tex. R. Rs. 4-8½ g. 362 m. 25 lo. 900 c.
J. F. Crosby, *Gen. Man*.........Houston, Tex.
P. B. Watson, *Pur. Agt*.........Houston, Tex.
C. A. Burton, *Supt*.........Houston, Tex.
D. C. Smith, *M. M*.........Houston, Tex.
J. M. Mather, *M. C. B*.........Houston, Tex.
M. L. & T. Div.: G. Pandeley, *Supt.* N. Orleans, La.
N. Tilton, *M. M*.........Algiers, La.
William O'Brien, *M. C. B*.........Algiers, La.
Texas & Pacific Ry. (*See St. L., Iron M. & S'n. R. R.*)
Texas & St. Louis Ry. 3 g. 258 m. 15 lo. 280 cars.
Gen. Supt.........Tyler, Tex.
F. W. Paramore, *Pur. Agt*.........St. Louis, Mo.
W. J. Lewis, *M. M*.........Tyler, Tex.
Tioga and Elmira State Line R. Rs.
4-8½ and 6 g. 54 m. 17 lo. 953 cars.
L. H. Shattuck, *Supt*.........Blossburg, Pa.
James A. Drake, *Pur. Agt*.........Elmira, N. Y.
Pere Bonny, *M. M*.........Blossburg, Pa.
D. H. Stratton, *M. C. B*.........Blossburg, Pa.
Toledo, Ann Ar. & Gr. Tr. Ry. 4-8½ g. 84 m. 7 lo. 107 c.
M. D. Woodford, *Gen. Man*..Ann Arbor, Mich.
H. W. Ashley, *Supt. & Pur. Agt.* do
C. C. Dodge, *M. M*.........Ann Arbor, Mich.
Toledo, Delphos & Burl. R. R. 3 g. 422 m. 21 lo. 694 c.
T. A. Phillips, *Gen. Man*.........Toledo, O.
J. H. F. Wiers, *Supt. Mach. & P. Agt* Toledo, O.
Tol. & Day. Div.: A. M. Matheany, *Supt.*; and
E. Clemons, *M. M*.........Delphos, O.
S.-E'n Div.: R. B. Jones, *Supt*.........Dayton, O.
F. McCreary, *M. M*.........Dayton, O.
Toledo & South Haven R. R. (*See Paw Paw.*)
Tonawanda Valley R. R. 3 g. 19 m. 1 lo. 13 cars.
J. V. D. Loomis, *Supt*.........Attica, N. Y.
Toronto, Grey & Bruce Ry. 4-8½ g. 191 m 20 lo 446 c.
Edmund Wragge, *Gen. Man*.....Toronto, Can.
W. Watson, *Pur. Agt*.........Toronto, Can.
David Preston, *M. M*.........Toronto, Can.
Toronto & Nipissing Ry. 3-6 g. 105 m. 12 lo. 211 c.
John Duncan, *Supt*.........Toronto, Can.
John Symons, *Pur. Agt*.........Toronto, Can.
J. Haggas, *M. M*.........Toronto, Can.
Troy & Boston R. R. 4-8½ g. 48 m. 20 lo. 484 cars.
D. Robinson, *Pres. & Pur. Agt*......Troy, N. Y.
Joseph Crandell, *Supt*.........Troy, N. Y.
Z. B. Davis, *M. M*.........Troy, N. Y.
R. V. Coon, *M. C. B*.........Troy, N. Y.
Tuckerton R. R. 4-8½ g. 31 m. 2 lo. 28 cars.
J. J. Pharo, *Supt*.........Tuckerton, N. J.
Tuskegee R. R. 3 g. 5 m. 1 lo. 6 cars.

U

Ulster & Delaware R. R. 4-8½ g. 74 m. 7 lo. 142 cars.
Jas. H. Jones, *Supt*.........Rondout, N. Y.
Geo. W. Wright, *M. M*.........Rondout, N. Y.
John H. Decker, *M. C. B*.........Rondout, N. Y.
Union Pacific Ry. (4 Gen. Divs.)
3 & 4-8½ g. 3,650 m. 318 lo. 6,157 cars.
S. H. H. Clark, *Gen. Man*.........Omaha, Neb.
Thos. L. Kimball, *Asst. Gen Man.* Omaha, Neb.
A. D. Clarke, *Pur. Agt*.........Omaha, Neb.
(1) Union Div.: J. T. Clark, *Gen Supt*...Omaha, Neb.
I. H. Congdon, *Gen. M. M*.........Omaha, Neb.
Geo. E. Stevens, *Supt. Car Dept.* Omaha, Neb.
East. Divs.: P. J. Nichols, *Supt*....Omaha, Neb.
Robt. McConnell, *M. M*.........Omaha, Neb.
A. M. Collett, *M. C. B*.........Omaha, Neb.
Jas. H. McConnell, *M. M*.....No. Platte, Neb.
A. Reis, *For. Car. Sh*.........No. Platte, Neb.
Mtn. Div.: Robt. Law, *Supt*....Cheyenne, Wy. T.
T. A. Davies, *M. M*.........Cheyenne, Wy. T.
J. E. Davies, *For. Car. Sh.* Cheyenne, Wy. T.
Lar. Div.: E. Dickinson, *Supt*...Laramie, Wy. T.
R. Galbraith, *M. M*.........Laramie, Wy. T.
R. M. Galbraith, *M. M*.........Rawlins, Wy. T.
Frank Blake, *For. Car. Sh*....Rawlins, Wy. T.
West. Div.: W. B. Doddridge, *Supt.* Evanston, Wy. T.
C. C. Quinn, *M. M*.........Evanston, Wy. T.
R. V. Brinkley, *For. Car. Sh.* Evanston, Wy. T.
Utah Nor. Div.: G. W. Thatcher, *Supt.*, Logan, U.
R. Craft, *M. M*.........Logan, U.
F. Reardon, *M. M*.........Eagle Rock, Idaho.
F. M. Shoemaker, *For. Car. Sh.* Eagle R'k, Ida.
Col. Div.: A. A. Egbert, *Supt*.........Denver, Col.
Fred. Metzheimer, *M. M*.........Golden Col.
E. G. Thomas, *For. Car. Sh*.........Golden, Col.
St. J. & W'n. Rd.: L. D. Tuthill, *Supt.* St. Joseph, Mo.
E. Sleppy, *M. M*.........Grand Island, Neb.
E. Hansen, *For. Car. Sh*.........Elwood, Kan.
(2) Kansas Div.: S. T. Smith, *G. Supt.* Kansas C'y, Mo.
Jno. Mackenzie, *Supt. Mach.* Armstrong, Kan.
T. B. Roberts, *M. C. B*....Armstrong, Kan.
K. Val. Div.: J. O. Brinkerhoff, *Supt.* Kan. C'y, Mo.
Jas. Mackenzie, *M. M*.........Armstrong, Kan.
Smoky Hill & Denver Divs.:
O. H. Dorrance, *Supt*.........Wallace, Kan.
J. B. Dailey, *M. M.* (S. H. Div.).....Ellis, Kan.
Chey. Div.: A. A. Egbert, *Supt*.....Denver, Col.
R. McDougall, *M. M.* (D.& C. Divs.) Denver, Col.
W. Ogle, *For. Car. Sh.* (D.& C. Divs.) do.
(3) Denver & South Park Div. 3 ft. gauge 227 miles.
C. W. Fisher, *Gen Supt*.........Denver, Col.
J. H. Kirk, *M. M*.........Denver, Col.
(4) Nevada Central Ry. 3 g. 93 m. 5 lo. 82 cars.
F. W. Dunn, *Supt*.........Battle Mountain, Nev.
Z. T. Spriggs, *M. M*.....Battle Mountain, Nev.
United States Rolling Stock Co. 23 lo. 4,834 cars.
A. Hegewisch, *Pres*.........New York, N. Y.
C. F. Jauriet, *Gen. M. M. & P. A*..Chicago, Ill.
Utah Central Ry. 4-8½ g. 280 m.
John Sharp, *Gen. Supt*...Salt Lake City, Utah.
S. H. Hill, *Pur. Agt*......Salt Lake City, Utah.
W. B. Armstrong, *M. M*..Salt Lake City, Utah.
Peter Reid, *M. C. B*......Salt Lake City, Utah.
Utah & Nevada Ry. 3 g. 37 m.
W. W. Ritter, *Gen. Man*...Salt Lake City, Utah.
Robert Anderson, *M. M*...Salt Lake City, Utah.
Utah & Pleasant Valley Ry. 60 m.
G. M. Young, *Man*.......Salt Lake City, Utah.
Utica, Ithaca & Elmira Ry. 4-8½ g. 127 m. 11 lo. 152 c.
G. Jas. Rice, *Pres & Supt*. Horse Heads, N. Y.
J. L. Greatsinger, *Pur. Agt*....Breesport, N. Y.
Geo. W. Cleveland, *M. M*......Breesport, N. Y.
Wm. Ells, *M. C. B*.........Breesport, N. Y.
Utica, & Black Riv. R. R. 4-8½ g. 180 m. 22 lo. 329 c.
J. F. Maynard, *Gen. Supt. & P. A*..Utica, N. Y.
John Bailey, *M. M*.........Utica, N. Y.
David James, *M. C. B*.........Utica, N. Y.

V

Vaca Vall. & Clear Lake R. R. 4-8½ g. 30 m. 2 lo. 19 c.
G. B. Stevenson, *Gen. Supt*......Vacaville, Cal.
Valley Ry. 4-8¾ g. 59 m. 10 lo. 317 cars.
Samuel Briggs, *Supt*.........Cleveland, O.
B. C. Bosworth, *M. M*.........Cleveland, O.
Chas. Blanchard, *M. C. B*.........Cleveland, O.
Vermont Valley & Sullivan R. Rs. (*See Conn. Riv.*)
Vernon, Greensburg & Rushville R. R. 25 m.
Horace Scott, *V.-Pres*.........Greensburg, Ind.
Vicksburg, Shreveport & Pacific, and
Vicksburg & Meridian R. Rs. (*See Cin., N. O. & T. P.*)

Victoria Ry. (*See Midland of Can.*)
Virginia Midland Ry. (*See Rich. & Dan.*)
Virginia & Truckee R. R. 4-8½ g. 52 m. 24 lo. 354 c.
Carson & Colorado R. R. 3 g. 150 m. 4 lo. 76 c.
H. M. Yerington, *Gen. Supt*......Carson, Nev.
R. J. Laws, *Supt.* (C. & Co.) Mound House Nev.
C. P. Mason, *Pur. Agt*.........Carson, Nev.
I. N. Fording, *M. M*.........Carson, Nev.
B. Lyons, *M. C. B*.........Carson, Nev.

W

Wabash, Chester & W'n R. R. 4-8½ g. 42 m. 2 lo. 32 c.
J. L. Hinckley, *Gen. Supt*.........Chester, Ill.
Wabash, St. Louis & Pacific Ry. (3 Gen. Divs.
4-8½ g. 3,241 m. 559 lo. 17,230 cars.
John C. Gault, *Gen. Traffic Man.* St. Louis, Mo.
Robert Andrews, *Gen. Supt*.....St. Louis, Mo.
W. F. Merrill, *Asst. Gen. Supt*....St. Louis, Mo.
R. W. Green, *Pur. Agt*.........St. Louis, Mo.
(1) Eas'n Div.: U. H. Kohler, *G. M. C. B*...Toledo, O.
Ohio & Ind. Div.: G. W. Stevens, *Supt.*; and
C. R. Morris, *M. M*.........Fort Wayne, Ind.
Ill. Div.: H. F. Clark, *Supt*.........Springfield, Ill.
Jacob Johann, *G. M. M*.........Springfield, Ill.
B. B. Rose, *M. C. B*.........Decatur, Ill.
Rant'l Div.: B. F. Mathias, *Supt*.....Rantoul, Ill.
J. McCarthy, *M. M*.........Rantoul, Ill.
Cairo Div.: D. G. Moore, *Supt*.........Cairo, Ill.
A. Van Tuyl, *M. M*.........Carmi, Ill.
(2) St. L., K. C. & N. Div.: G. W. Parsell, *Supt.* and
W. H. Selby, *M. M*.........Moberly, Mo.
C. S. Buck, *M. C. B*.........Moberly, Mo.
Kan. Cy. Div.: M. G. Cary, *Supt.* Kansas City, Mo.
C. B. & O. Div.: J. W. Blanchard, *Supt.*; and
J. S. Hazen, *M. C. B*.........Stanberry, Mo.
Quincy Div.: F. D. Schermerhorn, *S*..Quincy, Ill.
(3) Chi. & Ia. Div.: Wm. O. Hewitt, *M. M*..Peoria, Ill.
R. M. Hemphill, *M. C. B*.........Peoria, Ill.
Chicago Div.: A. A. Hobart, *Supt*....Chicago, Ill.
Peoria Div.: F. L. Tomkins, *Supt*.....Peoria, Ill.
Iowa Div.: E. N. Armstrong, *Supt*.....Keokuk, Ia.
D. Moin. Div.: H. B. Skeele, *Supt*..Des Moines, Ia.
Walla Walla & Columbia Riv. R. R. (*See Ore. Ry.*)
Walkill Ry. 4-8½ g. 117 m. 9 lo. 169 cars.
G. H. Graves, *Supt*.........Rondout, N. Y.
J. B. Dykeman, *M. M*.........Rondout, N. Y.
John H. Decker, *M. C. B*.........Rondout, N. Y.
Wasatch & Jordan Val. R. R. 3 g. 44 m. 7 lo. 300 c.
Geo. M. Young, *Supt*.....Salt Lake City, Utah.
Warwick Valley R. R. 4-8½ g. 28 m. 2 lo. 18 cars.
Grinnell Burt, *Pres. & Pur. Agt.* Warwick, N. Y.
Chas. Caldwell, *Supt*.........Warwick, N. Y.
Washington & Ohio R. R. 4-8½ g. 52 m. 5 lo. 83 c.
R. H. Havener, *Gen. Supt*.....Alexandria, Va.
Edward Dunn, *M. M*.........Alexandria, Va.
John Harrison, *M. C. B*.........Alexandria, Va.
Waynesburg & Washington Rd. 3 g. 28 m. 3 lo. 15 c.
Jacob Swart, *Gen. Man*.........Waynesburg, Pa.
J. G. Ritchie, *Supt*.........Waynesburg, Pa.
Welland Ry. 4-8½ g. 25 m. 3 lo. 147 cars.
William Pay, *Supt*.........St. Catharines, Ont.
Jas. Taylor, *M. M*.........St. Catharines, Ont.
Wm. H. Pay, *M. C. B*......St. Catharines, Ont.
West End Narrow Gauge Ry. 3 g. 16 m.
Rolla Wells, *Supt*.........St. Louis, Mo.
West Feliciana R. R. 4-8½ g. 27 m. 2 lo. 22 cars.
J. B. McGehee, *Pr. & Gen. Supt.* Bayou Sara, La.
J. A. Tilton, *M. M. & C. B*.....Bayou Sara, La.
West Jersey R. R. (*See Penn. R. R.*)
West Virginia, Central & Pittsb'g Ry. 13 m. 3 lo. 19 c.
W. E. Porter, *Gen. Supt*......Piedmont, W. Va.
E. W. Lippencott, *M. M. & M. C. B*..Piedmont.
Western R. R. (of Ala.) 5 g. 88 m. 15 lo. 270 cars.
Atlanta & W. Point Rd. 5 g. 87 m. 14 lo. 205 c.
Cecil Gabbett, *Gen. Man. & Supt*...Mont., Ala.
Robert King, *M. M*.........Montgomery, Ala.
F. M. Wade, *M. C. B*.........Montgomery, Ala.
Western Counties' Ry. 4-8½ g. 67 m. 8 lo. 137 cars.
J. Brignell, *Supt*.........Yarmouth, N. Y.
Western Maryland R. R. 4-8½ g. 157 m. 16 lo. 394 c.
J. M. Hood, *Pr. & Gen. Man*.... Baltimore, Md.
R. J. Adair, *Pur. Agt*.........Baltimore, Md.
David Holtz, *Mast. of Mach.* Union Bridge, Md.
J. H. Nussear, *M. C. B*.....Union Bridge, Md.
Western No. Carolina R. R. 4-8½ g. 155 m. 6 lo. 36 c.
V. E. McBee, *Supt*.........Salisbury, N. C.
Geo. P. Erwin, *Pur. Agt*.........Salisbury, N. C.
G. W. Gates, *M. M*.........Salisbury, N. C.
Western & Atlantic R. R. 5 g. 138 m. 58 lo. 952 c.
R. A. Anderson, *Gen. Supt*.........Atlanta, Ga.
W. R. Webster, *Pur. Agt*.........Atlanta, Ga.
John H. Flynn, *M. M*.........Atlanta, Ga.
W. G. Grambling, *M. C. B*.........Atlanta, Ga.
Wheeling & Lake Erie R. R. 143 miles.
J. S. Oliver, *Gen. Man. & Supt*....Norwalk, O.
L. James, *Supt. Mach. & Car Dept.* do.
Whitby Pt., Perry & Lindsay Ry. (*See Midland, Can.*)
White Water R. R. 4-8½ g. 62 m. 5 lo. 170 cars.
W. W. Worthington, *Gen. Supt.* Ft. Wayne, Ind.
L. W. Wingert, *M. M. & C. B*......Harrison, O.
Whitefield & Jefferson R. R. 4-8½ g. 10 m.
A. L. Brown, *Supt*.........Whitefield, N. H.
Wicomoco & Pocomoke R. R. 4-8½ g. 23 m. 2 lo. 38 c.
H. R. Pitts, *Supt*.........Berlin, Md.
Williamstown R. R. 4-8½ g. 10 m. 1 lo. 10 cars.
Sam'l Garwood, *Supt*......Williamstown, N. J.
Wilmington & No'n R. R. 4-8¾ g. 77 m. 13 lo. 148 c.
J. H. Thompson, *Supt. & P. A*..Coatesville, Pa.
George Rommel, *M. M*.........Coatesville, Pa.
Alex. Maitland, *M. C. B*.........Coatesville, Pa.
Wilmington & Weldon; Northeastern S. C.;
Cheraw & Darlington; Cheraw & Salisbury; and
Wilmington, Columbia & Augusta R. Rs.
5 g. 516 miles 71 locomotives 942 cars.
R. R. Bridgers, *Gen. Man*....Wilmington, N. C.
J. F. Divine, *Gen. Supt*.......Wilmington, N. C.
John Bisset, *M. M*.........Florence, S. C.
W. H. Day, *M. C. B*.........Florence, S. C.
C. R. Clowe, *M. C. B*.........Wilmington, N. C.
Rich. & Petersb. R.R. 4-8½ g. 25 m 8 lo. 130 cars.
Wm. Royal, *Supt*.........Richmond, Va.
John O'Brien, *M. M*.........Richmond, Va.
Windsor & Annapolis Ry. 4-8½ g. 130 m. 10 lo. 156 c.
P. Innes, *Gen. Man*.........Kentville, N. S.
Wm. Yould, *M. M*.........Kentville, N. S.
Wm. Grierson, *M. C. B*.........Kentville, N. S.
Wisconsin Central R. R. 4-8½ g. 480 m 31 lo. 783 c.
F. N. Finney, *Gen. Man*.........Milwaukee, Wis.
J. W. Curtis, *Pur. Agt*.........Milwaukee, Wis.
J. B. Henney, *Supt. M. P. & M.* Stevens Pt., Wis.
Mil. & E'n Divs.: C. F. Dutton, *S.* Milwaukee, Wis.
W. & No. Div.: G. Campbell, *S.* Stevens Point, Wis.
Wood River Branch R. R. 4-8½ g. 6 m. 2 lo. 4 cars.
L. M. Barber, *Supt*.........Hope Valley, R. I.
Woodstock R. R. 4-8½ g. 14 miles. 1 lo. 5 cars.
J. G. Porter, *Supt*.........Woodstock, Vt.
Worcester R. R. (*See Junc. & Break.*)
Worcester & Nashua; and Nashua & Rochester R. Rs.
4-8½ g. 95 m. 20 lo. 468 cars.
C. S. Turner, *Pres. & G. Man.* Worcester, Mass.
G. W. Hurlburt, *Supt*.........Worcester, Mass.
John G. Brady, *M. M. & C. B.* Worcester, Mass.
Worcester & Shrewsbury R. R. 3 g. 3 miles.
J. F. Bigelow, *Supt*.........Worcester, Mass.
Worcester & Somerset R. R. 4-8½ g. 10 m. 1 lo. 4 c.
J. L. Bates, *Supt*.........Pocomoke City, Md.

Y

Youghiogheny R. R. 4-9 gauge.
Wm. Wilson, *Supt*.........Irwin's, Pa.

No Private Brands Imported

We have in stock the following well-known Standard Makers' Brands of

Roofing Plates

PRIME AND WASTERS.

M. F.
PONTYMISTER.
GILBERTSON.
P. T. L.
S. T. P.
L
ABERCARNE.
M. & J.
TALBOT.
MELYN.
E. C. C.
ALYN.
ABERTILERY.
YNIS.
L. F.

As so many inferior qualities of Tin Plates are now imported and being shipped to consumers under private brands, we solicit your business, based on giving Standard Makers' Brands only.

MERCHANT & CO.

IMPORTERS OF

Tin Plates, Metals, Etc.,

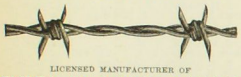
PHILADELPHIA, PA.

All orders and inquiries must be addressed to Philadelphia.

NEW YORK OFFICE,
Corner Cliff and Beekman Sts.

W. J. ADAM,

FENCE CONTRACTOR.



LICENSED MANUFACTURER OF

STEEL BARBED FENCE,

WIRE STAPLES, ETC.

WHOLESALER OF

Fence Tools, Iron, Oak and Cedar Posts.

Contracts for all kinds of Railroad Fencing solicited.

W. J. ADAM, Joliet, Ill.

W. D. WOOD & CO.'S

PATENT PLANISHED SHEET IRON.

Patented March 14, 1865; April 8, 1873; Sept. 9, 1873; Oct. 6, 1874; Jan. 11, 1876.

Guaranteed fully equal, in all respects, to the

MPORTED RUSSIA IRON,

And at a much less price.

LOCOMOTIVE JACKET IRON

Our Specialty.

For sale by all the principal Metal Dealers in the large cities throughout the United States, and at the office.

111 Water Street, Pittsburgh, Pa.

MANGANESE BRONZE.

The best wearing metal for Locomotives and Car Axle Bearings now in use. It is as near Anti Friction as metal can be made, while it retains all the strength of the Strongest Bronze. It is especially adapted to the use of Railroad Companies, Car and Locomotive Builders and Machinists.

MANUFACTURED BY

JOHN FITZSIMMONS, Brassfounder, 23 Carson St., Pittsburgh, Pa.

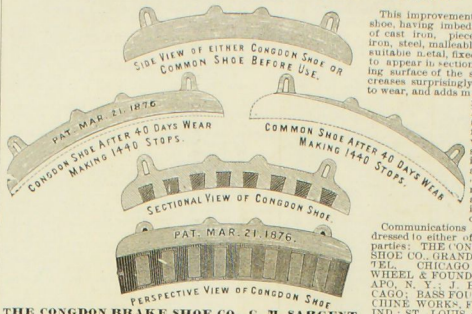
STEEL CASTINGS

FROM 1-4 TO 10,000 lbs. WEIGHT.

True to pattern, sound and solid, of unequaled strength, toughness and durability. An invaluable substitute for forgings or cast-iron requiring three-fold strength. Gearing of all kinds, Shoes, Dies, Hammer Heads, Cross-Heads for locomotives, etc. 15,000 Crank Shafts and 10,000 Gear Wheels of this steel now running prove its superiority over other steel castings. CRANK SHAFTS, CROSS-HEADS and GEARING specialties. Circulars and Price Lists free.

CHESTER STEEL CASTINGS CO.,
Works: CHESTER, Pa. 407 Library St., PHILADELPHIA.
C. HUBBARD, Agent, 46 Cliff Street, New York.

CONGDON'S IMPROVED CAR BRAKE SHOE.



This improvement consists of a shoe, having imbedded in its body of cast iron, pieces of wrought iron, steel, malleable iron, or other suitable metal, fixed therein so as to appear in sections on the wearing surface of the shoe, which increases surprisingly its resistance to wear, and adds materially to the friction or adhesion of the shoe to the surface of the wheel. These shoes are now in extensive and general use on many prominent railroads, and are effecting a saving of over fifty per ct.

Communications should be addressed to either of the following parties: THE CONGDON BRAKE SHOE CO., GRAND PACIFIC HOTEL, CHICAGO; RAMAPO WHEEL & FOUNDRY CO., RAMAPO, N. Y.; J. H. BASS, CHICAGO; BASS FOUNDRY & MACHINE WORKS, FORT WAYNE, IND.; ST. LOUIS CAR WHEEL CO., ST. LOUIS, MO.

THE CONGDON BRAKE SHOE CO., C. M. SARGENT, General Manager, Grand Pacific Hotel, Chicago, Ill.

STEAM PUMPS

For Boiler Feeding and Fire Protection a Specialty.

THE IMPROVED DAYTON CAM PUMP,

Designed and built especially for BOILER FEEDING and for PUMPING HOT WATER.

Steam Pumps and Hydraulic Machinery

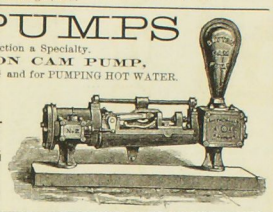
For Railroad Purposes.

The Combined Pump and Boiler, with Removable Water Cylinder.

The MOST POWERFUL FIRE PUMPS ever made. Every machine warranted. Over 1,500 in use. Send for Descriptive Circulars.

SMITH, VAILE & CO., Dayton, O.

CHICAGO HOUSE, 24 WEST LAKE STREET.



CHAINS

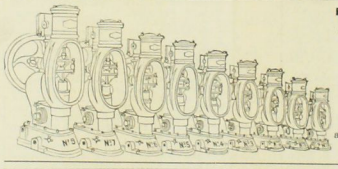
UNION CHAIN WORKS

REITER & CO.,

MANUFACTURERS OF ALL KINDS OF CHAINS

BRAKE CHAIN A SPECIALTY.

Twenty-Ninth and Railroad, Pittsburgh, Pa.



THE STEAM PUMPS

MADE BY

VALLEY MACHINE CO.,

Easthampton, Mass.,

are the Best in the World for Boiler Feeding and other purposes.

WOOD WORKING MACHINERY

UNIVERSAL WOOD-WORKERS,

PLANERS, MATCHERS,

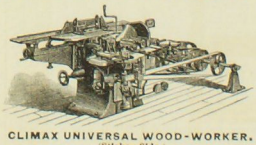
BAND SAWS, SCROLL SAWS,

RAIL-ROAD AND CAR

MACHINERY.

BENTEL, MARGEDANT & CO.,

HAMILTON, OHIO, U. S. A.



CLIMAX UNIVERSAL WOOD-WORKER.
(Sticker Side.)

CARPETS

A SPECIALTY.

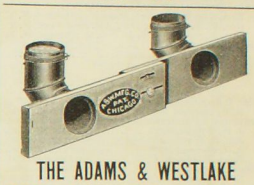
W. & J. SLOANE

Have a large line of Superior Carpetings suitable for furnishing Parlor and Sleeping Cars.

ALSO

OIL CLOTH,
COCOA and
ROPE MATS,
MATTING,
RUBBER MATS.

649, 651 and 655
BROADWAY,
N. Y.



THE ADAMS & WESTLAKE

Window Ventilator

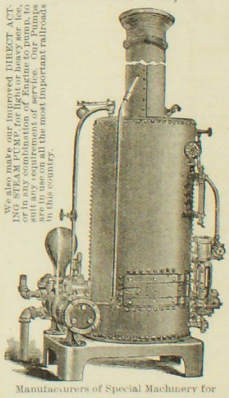
FOR RAILROAD OFFICES.

The only perfect device which will secure thorough ventilation. Adjustable to any size window. Each elbow contains a damper, so that the current of air can be easily regulated.

In ordering give width of the sash.

THE ADAMS & WESTLAKE MFG. CO.,
Cor. Franklin & Ontario Sts., Chicago;
45 Summer St., Boston;
7 East Fourteenth St., New York.

COPE & MAXWELL MFG. CO.,
Hamilton, Ohio,



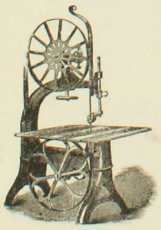
We also make our improved DIRECT ACTING STEAM PUMP for light or heavy service, or in fact any kind of a Steam Pump to suit any requirement of service. Our Pumps are in use on all the most important railroads in this country.

Manufacturers of Special Machinery for

R. R. WATER-STATION PUMPIN

MANUFACTURERS OF WOOD-WORKING MACHINERY.

BAND SAW.



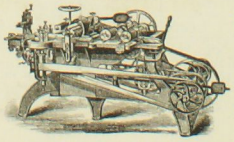
The Latest Improved

MACHINERY

for

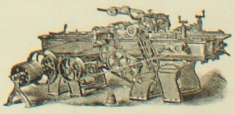
Railroad Car Shops.

OUTSIDE MOLDER.



Planers, Vertical Car Tenoners, Gaining, Tenoning, Rotary Mortising Machines.

INSIDE MOLDER.



C. B. ROGERS & Co., MANUFACTORY, NORWICH, CONN. WAREROOMS, 109 Liberty St., New York.

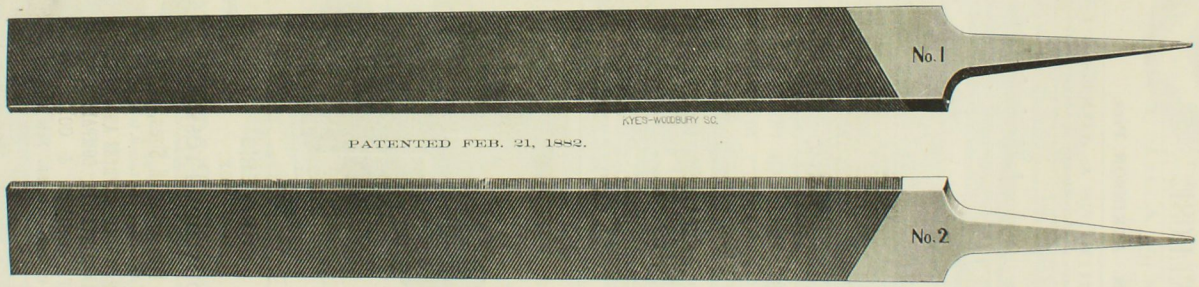
NEW AMERICAN FILE CO.

PAWTUCKET, R. I., U. S. A.,

MANUFACTURERS OF

FILES AND RASPS

OF EVERY DESCRIPTION.



PATENTED FEB. 21, 1882.

Above are plates of our Patent Safe Edge Files. By the old style the Mechanic had to hold the File to the safe edge, and this he would not do at all times, and his not doing so admitted of the Stock being removed faster from than in the corner; and in endeavoring to overcome this and get the corner down to its proper level the tendency was to lift the outer or cutting edge of the File, and in so doing the upper side of the safe edge would come in contact with metal and thus throw off the lower edge. To overcome this, we present to the Mechanic a File which will hold itself to the corner and will require considerable effort to keep it away. We reverse the cuts, and cut the sides rights and lefts, and, you can see by the plates above, the Files will guide themselves and overcome that rocking motion that usually occurs.

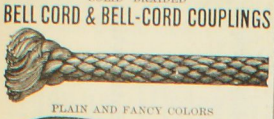
WHEN ORDERING SPECIFY PATENT CUT.

These Files will be found, like all other Files manufactured by this Company, to be Splendidly Cut and Tempered, and Warranted to give Satisfaction.

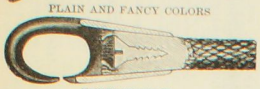
We are safe in asserting that we make more files for machine shop use than any manufactory in the country, and the appreciation of their superior excellence has increased our trade over three hundred per cent. within three years. We now have a capacity of one thousand dozen per day, and are carrying a stock of from fifty to seventy-five thousand dozen. We are able to meet the wants of our patrons without delay or inconvenience to either party. Our Files are carried in large quantities in about every city in the United States. Ask any wholesale hardware or railway supply house. If you are not using them, ask your neighbor for his opinion, as he will be pretty apt to know.

SOLID BRAIDED

BELL CORD & BELL-CORD COUPLINGS



PLAIN AND FANCY COLORS



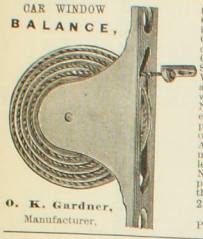
MANUFACTURED BY

SILVER LAKE CO.

WELLINGTON BROS. & CO., Agents, BOSTON.

CAR WINDOW

BALANCE,



for Passenger Coaches, Sleeping and Parlor Car Windows, consisting of Cone and Coil Spring with Wire Cord, balancing the weight of sash. Noiseless in operation, and placed entirely out of sight. Adopted by many of the leading roads. No car complete without them.

O. K. Gardner, Manufacturer.

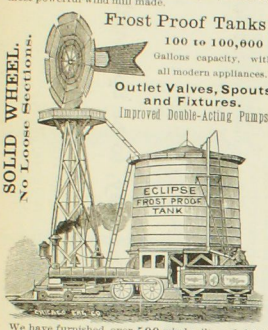
28th and Railroad Sts., Pittsburgh, Pa.

Eclipse System of Water Supply for Railroads.

ECLIPSE SOLID WHEEL WIND MILLS.

Tested 4 yearsr Perfectly self-regulating. Conceded by the leading railway companies of this and other countries to be by far the strongest, safest and most powerful wind mill made.

SOLID WHEEL. No Loose Sections.



Frost Proof Tanks

100 to 100,000

Gallons capacity, with all modern appliances.

Outlet Valves, Spouts and Fixtures.

Improved Double-Acting Pumps.

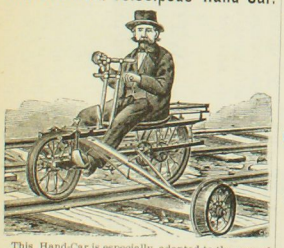
We have furnished over **500** wind mills and **250** complete water stations in 1881 to the leading railroads in the United States and Canadas. Two million feet of tank lumber constantly on hand. Our capacity is such that we can execute large orders promptly. Complete stations erected on trial when desired to test the correctness of our claims. Send for catalogue and price-list.

ECLIPSE WIND ENGINE CO.,

W. H. WHEELER, Manager,

BELOIT, WIS.

The Sheffield Velocipede Hand-Car.



This Hand-Car is especially adapted to the use of **Road-Masters, Bridge Inspectors, Telegraph Line Repairers, Track Inspectors, Track Walkers, Wood** and **Tie Inspectors,** and for all work where one or two men wish to go over the line at will. Also, our Telegraph Cars, capable of carrying two men and material. Light, Easily Handled, and when ready for shipment occupy very little space in Baggage Car—a great advantage to railroad men. Run easily, being propelled by the **ROWING MOVEMENT.** Can be run short distances at the rate of **20 Miles an hour; and will not jump the track.**

HENRY W. PEABODY & CO.,

114 STATE STREET, BOSTON,

GENERAL PURCHASING AGENTS

For Foreign Railway and Tramway Companies

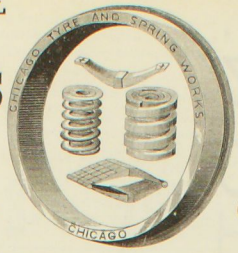
MANUFACTURERS OF

CAST STEEL LOCOMOTIVE TYRES

Any specification.

Works at

MELROSE, ILL.



CAST STEEL CAR SPRINGS

of every description.

Office,

157 WASHINGTON ST.,

CHICAGO, ILL.

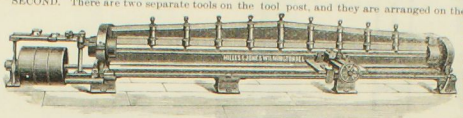
F. M. ATKINSON, Pres. **C. H. FERRY,** Treas.

HILLES & JONES' PLATE PLANER.

Notice the following Great Advantages this Machine has over all others:

FIRST. It will plane 13 ft. 10 in. long at one setting, and by resetting or moving the plate endwise will plane any length of plate.

SECOND. There are two separate tools on the tool post, and they are arranged on the saddle for easy and independent adjustment and the cut is taken both ways on the plate; the hand-wheel shown feeds both tools at the same time.



THIRD. The machine is so designed that the large table holds the plate and at the same time allows the cross-bridge to adjust quickly setting the edge of straightening and taking the buckles out of the edge of the plate, and at the same time they assist in holding it securely while being planed.

FOURTH. The large steel screw that moves the saddle is supported its entire length, lying in a groove that keeps it always well oiled and prevents it from being sprung or bent. The belt shifting arrangement is such that a very short movement of the saddle is obtained when desired.

NOTICE.—We will guarantee that this machine will do as much work in one hour as the best boiler-maker will chip in twelve hours, and the machine will do it correctly, while the boiler-maker will do it irregularly and in a great measure cut or score the adjoining sheet, thus weakening it.

BOXED AND DELIVERED FREE ON BOARD AT WILMINGTON.

HILLES & JONES, - WILMINGTON, DELAWARE.

THE AMERICAN STAR BICYCLE.

A SAFETY MACHINE.

A Practical Roadster, Safe from "Headers" or Other Dangerous Falls.

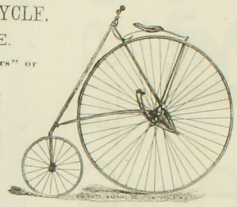
The means of propulsion insure a continuous power *without dead centres*—a conceded advantage in making the ascent of long steep hills, or going over rough, muddy or sandy roads.

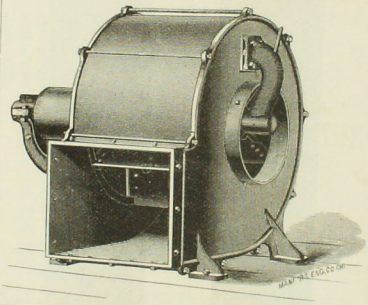
The machine is durably constructed and is not liable to get out of order; is easily managed and guided, and the rider sits erectly, there being no tendency to make the shoulders rounded.

For further particulars address the manufacturers.

H. B. SMITH MACHINE CO.,

Smithville, Burlington Co., N. J.





BENJAMIN, FISCHER & MALLERY,

MANUFACTURERS OF

WOOD-WORKING MACHINERY.

SPECIALTIES:

Triumph Planing Machines, Single and Double Surfacers, Siding and Re-sawing Machines, Shaving Exhausters and Automatic Knife Grinders.

ESTIMATES GIVEN

on Engines, Boilers, Pumps, Heaters, Pulleys and Hangers.

Address

BENJAMIN, FISCHER & MALLERY,

26 S. Canal St., Chicago, Ill.

WORKS:

22 and 24 S. Jefferson Street.

SHRIVER'S

NEW YORK

Copying Presses.

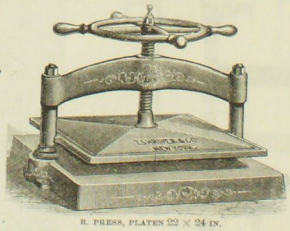
Presses of all Sizes,

From the Smallest to the Largest, in use by

RAILROAD, EXPRESS AND TRANSPORTATION COMPANIES.

T. SHRIVER & CO.,

333 E. Fifty-Sixth St., New York.



R. PRESS, PLATEN 22 × 24 IN.

CLEVELAND

IRON ORE PAINT COMPANY,

Manufacturers of

PURE IRON ORE PAINTS,

Red (Rosite) Purple and Brown.

We guarantee all our Paints, and respectfully solicit the patronage of consumers and dealers. Send for price-list.

Office, 79 Columbus St., Cleveland, O.

Our Paints are used largely by the Railroads and Car-Builders of our country.

BEST IRON PAINT.

Crane Brothers Manufacturing Co.,

Offices, No. 10 N. Jefferson St., Chicago,

MANUFACTURERS OF

WROUGHT-IRON PIPE,

Brass and Iron Goods

For Steam and Gas Fitters and Engine Builders,

CAST IRON AND MALLEABLE IRON FITTINGS,

Steam Pumps, Injectors, &c.,

Hollow Stay-Bolt Iron, Babbitt Metal, &c.

MALLEABLE IRON CASTINGS,

GRATE BARS, &c.

W. R. BURT,

Buffalo, N. Y.

ADDRESS,

P. O. Drawer 266.

Michigan Pine Lumber, Car Siding, Roofing, etc.

Manufacturer

East Saginaw, Mich.

Planing Mill & Yard

Buffalo, N. Y.

DELL NOBLIT. JOSEPH C. NOBLIT. THOS. HOPE.

DELL & JOSEPH C. NOBLIT & CO.,

IMPORTERS AND MANUFACTURERS OF

UPHOLSTERY GOODS

AND

CABINET HARDWARE,

RAILROAD & STEAMBOAT SUPPLIES,

Plushes, Burlaps, Springs, Hair, Moss, etc., etc., especially adapted for Railroad Cars.

Nos. 220 and 222 South Second Street,

PHILADELPHIA.

335 BROADWAY, NEW YORK.

RAILWAY SUPPLIES.

H. L. LEACH,

NEW ENGLAND AGENT

FOR

Nathan & Dreyfus—Oilers and Lubricators and Freidmann's Injectors and Ejectors; C. W. Pickering & Co.—Locomotive and Car Springs.

Boiler Tubes, Plate Iron and Steel Boilers, Tanks, Machinists' Tools, Locomotive Frames, Crank-Pins, Axles, Head Lights, Steam Gauges, Car Wheels, Etc., Etc.

77 WATER STREET, BOSTON, MASS.

BOUND VOLUMES

OF

The Car-Builder

For 1880 and 1881.

Price, $3.00 each.

National Car-Builder,

5 Dey Street.

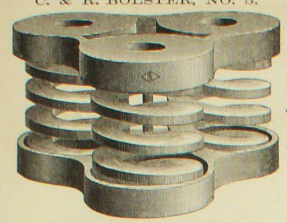
EWALD IRON COMPANY, OWNERS AND OPERATORS OF

TENNESSEE ROLLING WORKS,

Manufacturers of the Well-Known Tennessee Charcoal Bloom Boiler Plate, Flange, Fire-Box, Sheet, Bar and Stay Bolt Iron.

OFFICE, 801 NORTH SECOND STREET, ST. LOUIS MO.

C. & R. BOLSTER, NO. 5.



Diameter.....11⅝ inches.
Height..... 6¼ "
Capacity, each spring, 30,000 lbs.

CLIFF, RIGHTER & CO.

MANUFACTURERS OF

Railway Car Springs.

NO. 5 DEY STREET,

NEW YORK.

DIAMOND STATE CAR SPRING WORKS.

Eureka Edge Rolled Buffer, or Draw Spring

Patented July 1, 1874. Reissued March 9, 1875.

Manufacturers of Elliptics, Locomotive and Improved Flat and Round Bar

NEST SPRINGS,

Of the Best Grade of Cast Spring Steel.

JAMES P. HAYES.

Jas. P. Hayes & Co.,

WILMINGTON, DEL.

SPIRAL SPRINGS

Of Every Description.

JAMES C. PICKELS.

JAMES JEFFRIES & SONS,

MANUFACTURERS OF

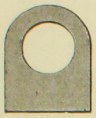
ELLIPTIC & HALF ELLIPTIC CAST-STEEL SPRINGS,

For Railroad Cars and Locomotives.

813 JAYNE STREET, PHILADELPHIA, PA.

VULCANIZED FIBRE COMPANY,

SOLE MANUFACTURERS OF



HARD & FLEXIBLE VULCANIZED FIBRE.

Flexible Vulcanized Fibre Dust Guards and Oil-Box Covers,

being absolutely unaffected by oil or heat, are far more durable and efficient than Leather, and much cheaper.

Office and Works; Wilmington, Del.

COLUMBIA CAR SPRING CO.,

322 SEVENTH AVENUE,

Cor. Twenty-eighth St., NEW YORK.

BRANCHES:

36 Dearborn Street, Chicago, Ill.
713 N. Second Street, St. Louis, Mo.
208 South Fourth St., Philadelphia, Pa.
109 Milk Street, Boston.
123 Central Avenue, Cincinnati.
16 S. Howard Street, Baltimore, Md.

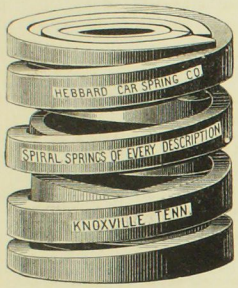
F. H. ANDREWS, President and Treasurer.
B. A. CLOONEY, Sec. and Gen'l Sup't.

HEBBARD CAR SPRING CO.,

MANUFACTURERS OF

Steel Spiral Car Springs

OF EVERY DESCRIPTION,



Knoxville, Tenn.

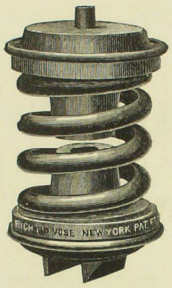
NATIONAL

Car Spring Company.

RICHARD VOSE, President.

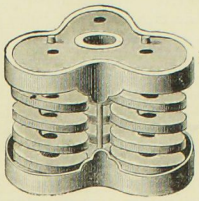
NEW YORK: 13 Barclay St.
CHICAGO: 184 & 186 Washington St.
ST. LOUIS: 714 N. 2d St.
PHILADELPHIA: 208 Walnut St.

VOSE GRADUATED EQUALIZER RUBBER CONE.



Adapted to a Car-Body Weighing 32,000 Lbs.
Diameter, outside Casting, 8 in.
Height, Bearing to Bearing, 11¼ in.

KEYSTONE CAR SPRING WORKS.



EDGE ROLLED

SPIRAL DRAW BOLSTER

AND

EQUALIZING SPRINGS,

AND

SPIRAL SPRINGS

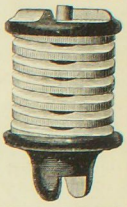
OF ALL DESCRIPTIONS.

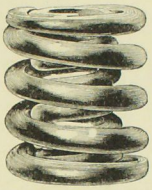
CHARLES SCOTT,

MANUFACTURER.

1,016 and 1,018 New Market St.,

PHILADELPHIA, Pa.





French Spiral Spring Co.

LIMITED.

SPIRAL RAILWAY CAR SPRINGS,

Street Car, Buffer, Freight Bolster,

Journal and Equalizing Bar Springs.

Brake Release, Switch, Valve and Machinery Springs.

AARON FRENCH, CHAIRMAN. CALVIN WELLS, DIRECTING MANAGER.
GEO. W. MORRIS, SEC'Y. FRANK S. LAYNG, TREAS.
WALTER P. HARRILL, SUP'T.

Corner of Twenty-Sixth and Liberty Streets, PITTSBURGH, PA.

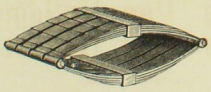
NEW YORK: 115 Broadway, Room 91, H. A. LITTLE, Agent.
CHICAGO: Room 6, Ashland Block, ROBERT WASON, Agent.
ST. LOUIS: M. M. BUCK & CO. Agents.

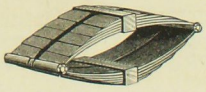
DETROIT CAR SPRING COMPANY,

MANUFACTURERS OF

OIL TEMPERED ELLIPTIC RAILWAY

CAR AND LOCOMOTIVE SPRINGS.

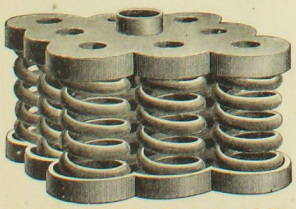


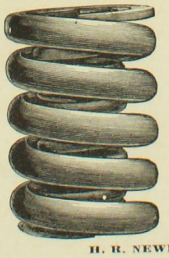


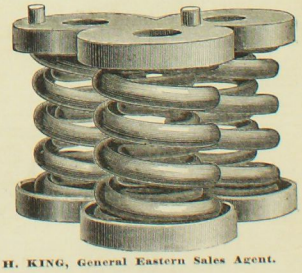
ALSO

SPIRAL, ROUND, FLAT AND EDGE ROLLED SPRINGS

OF ALL DESCRIPTIONS, FROM BEST CAST STEEL.







ALEX. DE LANO, Treasurer and Manager.

H. R. NEWBERRY, Secretary.

A. H. KING, General Eastern Sales Agent.

DETROIT, MICH.

New York Office, 46 CORTLANDT ST.

PARROTT VARNISH COMPANY,

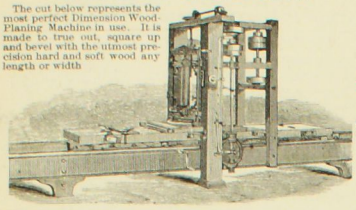
MANUFACTURERS OF FINE

RAILWAY VARNISHES,

BRIDGEPORT, CONN.

DANIELS PLANERS.

The cut below represents the most perfect Dimension Wood-Planing Machine in use. It is made to true out, square up and bevel with the utmost precision hard and soft wood any length or width



WOOD-WORKING MACHINERY,

MANUFACTURED BY

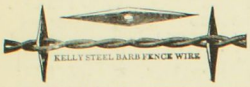
WITHERBY, RUGG & RICHARDSON, Worcester, Mass.,

26 SALISBURY STREET. (Shop formerly occupied by R. BALL & CO.

SPECIALTIES:

Woodworth Planing, Tonguing and Grooving Machines, Daniels Planers, Richardson's Patent Improved Tenon Machines, Mortising, Molding, Re-saw and Band Saw Machines, Picture Frame and Miter Cutting Machines, Box Machinery,

PATENT DOUBLE SAW BENCHES, SAW TABLES, &c.

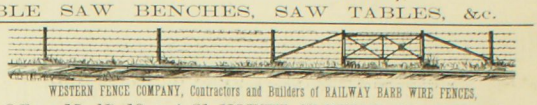


THORN WIRE HEDGE CO.,

CHICAGO,

MANUFACTURERS OF

KELLY STEEL BARB WIRE.



WESTERN FENCE COMPANY, Contractors and Builders of RAILWAY BARB WIRE FENCES,

Office: 15, 17, 19 and 21 NORTH CLINTON ST., CHICAGO.

EX INUTILI TRADE TANITE MARK UTILITAS

EMERY WHEELS AND GRINDING MACHINES.

THE TANITE CO.,

Stroudsburg, Monroe County, Pa.

Orders may be directed to us at any of the following addresses, at each of which we carry a stock:

New York, 42 Dey St.
Chicago, 152 and 154 Lake St.
" 40 Franklin St.
St. Louis, 209 North Third Street.
" " 811 to 819 North Second St.
Cincinnati, 212 West Second St.
Indianapolis, Maryland & Delaware Sts.
New Orleans, 61 St. Charles St.
San Francisco, 2 and 4 California St.
Philadelphia, 925 Market St.
Boston, 21 Doane St.
Portland, Oregon, 43 Front St.
London, Eng., 9 St. Andrews St., Holburn Viaduct, E. C.
Liverpool, Eng. 42, The Temple, Dale St.
Sydney, N. S. W., 17 Pitt St.

Emery Rolls for Car Brass Grinding.
Special Wheels for Phosphor-Bronze Boxes.
Automatic Car Brass Grinder.
Locomotive Slide Bar Grinder.

Important Specialty, Emery Wheels to grind Chilled Car Wheels. We sell to the actual user at unusually low prices. These wheels cannot be bought of any agent or dealer.

CURLED HAIR.
GLUE.
SAND PAPER.
EMERY CLOTH.

MANUFACTURED BY

BAEDER, ADAMSON & CO.

New York, 67 & 69 Beekman St.

PHILADELPHIA, 730 MARKET STREET.
BOSTON, 143 MILK STREET.
CHICAGO, 182 LAKE STREET.
CINCINNATI, 8 & 10 WEST PENN ST.

FELTING FOR REFRIGERATOR CARS AND BOILERS.

PALMER, PARKER & CO.,

MAHOGANY AND VENEERS,

AND ALL FOREIGN AND DOMESTIC CABINET WOODS.

MILL AND WAREROOMS:

PORTLAND, Cor. TRAVERS ST., BOSTON, MASS.

Send for Price List.

RAILWAY MACHINERY AND SUPPLIES.

L. G. TILLOTSON & CO.,

MANUFACTURERS OF

Railway Car Findings.

PLUSH IMPORTERS.

RUBBER GOODS,

COTTON WASTE.

DEALERS IN

RAILWAY SUPPLIES

OF EVERY DESCRIPTION.

Nos. 5 and 7 Dey Street, New York.

PORTLAND, ROMAN AND KEENE'S CEMENT.

FIRE-BRICK, ASPHALTE, ART, DECORATIVE, AND ENCAUSTIC TILING

S. L. MERCHANT & CO.,

41 Broadway, New York City.

Remit 50 cents in postage stamps for "Treatise on Cement," showing how to mix it and how to use it.

PENFIELD BLOCK CO.

Pulley Blocks and Iron Sheaves, Phosphor-Bronze Self-Lub. Sheaves, Ushers, Giant Jar, $5.00 each. Poor's Manual, 1880-81. See p. 53. Please write for lists, prices, etc.

LOCKPORT, N. Y.

TAPS, DIES AND GAUGES,

U. S. OR SELLERS & WHITWORTH STANDARD.

THE PRATT & WHITNEY CO.

Hartford, Conn.

Illustrated Catalogues and Price Lists furnished on application.

The Largest Manufacturers OF

Sheet-Iron Roofing

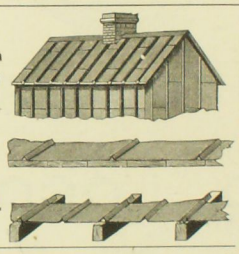
IN THE UNITED STATES.

Can give the best of References in every State and Territory.

PORTER IRON ROOFING CO.,

101, 103 and 105 West Front St., Cincinnati, O.

All kinds of Corrugated Iron furnished.



Send for Illustrated Catalogue and Mention this Paper.

National Car-Builder Supplement

FOR 1882.

Guaranteed Circulation 15,000 Copies.

The Second Annual Supplement to the NATIONAL CAR-BUILDER will be issued in May next.

Arrangements have been made with the manufacturers of railway materials to furnish copies to their foreign customers and correspondents, which will give a greater foreign circulation than any other paper published in the United States.

The Supplement will be a complete "Manual" of the railroads, street railroads and tramways of the United States, Canada, Mexico, West Indies, Central and South America.

Advertising rates and full information furnished on application to

NATIONAL CAR-BUILDER,

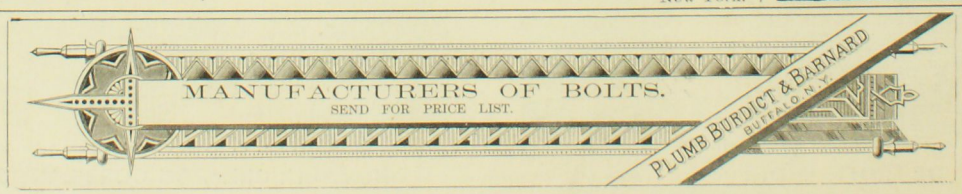
New York.

STEEL CASTINGS.

RAIL-ROAD AND MACHINE CASTINGS OF ALL KINDS FROM ½ LB TO 10 TON.

LOCOMOTIVE CROSS HEADS AND GEARING A SPECIALTY.

"EUREKA CAST STEEL CO."

No 307 WALNUT ST. PHILADA.

WESTERN OFFICE 45 LA SALLE ST. CHICAGO, ILL.